ELECTRA

Service Manual

DELTA 60Hz Series

Indoor Units	Outdoor Units
Delta 25	*DCR 25*
Delta 35	*DCR 35*
Delta 50	*DCR 50*

REFRIGERANT

R410A

HEAT PUMP

SM DEL60Hz 1-E.0 GB

AUGUST – 2009

CONTENTS

LIST OF EFFECTIVE PAGES

Note: Changes in the pages are indicated by a "Revision#" in the footer of each effected page (when none indicates no changes in the relevant page). All pages in the following list represent effected/ non effected pages divided by chapters.

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1. INTRODUCTION

1.1 General

The new outdoor **DCR** split wall mounted range has expanded, comprising three RC (heat pump) models, as follows:

- **DCR 25 60Hz**
- **DCR 35 60Hz**
- **DCR 50 60Hz**

The indoor units are available as *LED* display types only, featuring esthetic design, compact dimensions, and low noise operation.

- **Delta 25 DCI 60Hz**
- **Delta 35 DCI 60Hz**
- **Delta 50 DCI 60Hz**

1.2 Main Features

The **DCR** series benefits from the most advanced technological innovations, namely:

- DC inverter technology.
- R410A models
- Microprocessor control.
- Infrared remote control with LED display
- I Indoor large diameter cross flow fan, allowing low operation sound level
- Bended indoor coil with treated aluminum fins and coating for improved efficiencyNetworking system connectivity.
- High COP, Energy efficiency class A in cooling/heating mode for all models
- Torque control for compressor running in lower Freqency but with low vibration and little sound.
- Precharged refrigerant up to the max allowing tubing distance.
- Both mono spilt and multi split are available
- Self diagnostic LED lighting for ease of maintenance
- Cooling operation at outdoor temperature down to -10ºC.
- Heating operation at outdoor temperature down to -15ºC.
- Easy installation and service.

1.3 Indoor Unit

The indoor unit is wall mounted, and can be easily fitted to many types of residential and commercials applications.

Feature	Delta DCI
Display	LED
Ionizer	NO
ESF	NO
Indoor fan motor	Variable speed (PG)
Horizontal motorized louver	YES
Vertical motorized louver	NO
Heating element	NO
M2L Cable port	YES
Dry contact	Presence detector or (jumper selected) power shedding

1.4 Filtration

The **Delta DCI** series presents several types of air filters:

- Easily accessible, and re-usable pre-filters (mesh).

1.5 Control

The microprocessor indoor controller, and an infrared remote control, supplied as standard, provide complete operating function and programming.

Remote Control **RC7**

For further details please refer to the Operation Manual, Appendix A.

1.6 Outdoor Unit

The DCR outdoor units can be installed as floor or wall mounted units by using a wall supporting bracket. The metal sheets are protected by anti- corrosion paint work allowing long life resistance. All outdoor units are pre-charged. For further information please refer to the Product Data Sheet, Chapter 2.
It includes :

- Compressor mounted in a soundproofed compartment :
- Axial fan.
- Outdoor coil with hydrophilic louver fins for RC units.
- Outlet air fan grill.
- Interconnecting wiring terminal block.
- **DCR 25 R410A 60Hz**
- **DCR 35 R410A 60Hz**
- **DCR 50 R410A 60Hz**

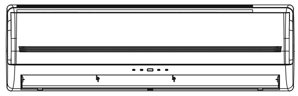
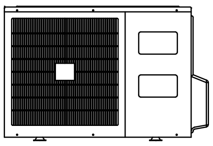
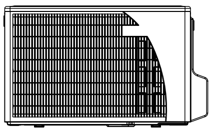
1.7 Tubing Connections

Flare type interconnecting tubing to be produced on site.
For further details please refer to the Installation Manual.

1.8 Inbox Documentation

Each unit is supplied with its own installation and operation manuals, one simly remote control manual.

1.9 Matching Table

			INDOOR UNIT		
OUTDOOR UNITS					
MODEL		**REFR”**	**Delta 25**	**Delta 35**	**Delta 50**
	**DCR 25**	**R410A**	√		
	DCR 35	**R410A**		√	
	**DCR 50**	**R410A**			√

2. PRODUCT DATA SHEET

2.1 Delta 25 DCI / DCR 25 60Hz R410A

Model Indoor Unit				**DELTA 25 DCI**	
Model Outdoor Unit				**DCR 25 R410A**	
Installation Method of Pipe				Flared	
Characteristics			Units	Cooling	Heating
Capacity (4)			Btu/hr	8530(3070-10920)	8530(3410-12620)
			kW	2.5(0.9-3.2)	2.5(1.0-3.7)
Power input (4)			kW	0.73(0.35-1.15)	0.69(0.35-1.15)
EER (Cooling) or COP(Heating) (4)			W/W	3.41	3.61
Energy efficiency class				A	A
Power supply			V	220-240	
			Ph	1	
			Hz	**60**	
Rated current			A	3.3	3.1
Power factor				0.97	0.97
Prated (IDU)			W	25	
Prated (IDU+ODU)			W	1300	
Starting current			A	10.5	
Circuit breaker rating			A	10	
INDOOR	Fan type & quantity			Crossflow x 1	
	Fan speeds	H/M/L	RPM	1200/1050/850	
	Air flow (1)	H/M/L	m3/hr	420/350/270	
	External static pressure	Min	Pa	0	
	Sound power level (2)	H/M/L	dB(A)	54/50/47	
	Sound pressure level(3)	H/M/L	dB(A)	39/35/32	
	Moisture removal		l/hr	1.0	
	Condenstate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	680x250x185	
	Net Weight		kg	7	
	Package dimensions	WxHxD	mm	740x310x248	
	Packaged weight		kg	10	
	Units per pallet		units	32 units per pallet	
	Stacking height		units	8 levels	
OUTDOOR	Refrigerant control			EEV	
	Compressor type,model			Rotary,Panasonic 5RS092XDJ01	
	Fan type & quantity			Propeller(direct) x 1	
	Fan speeds	H	RPM	830	
	Air flow	H	m3/hr	1460	
	Sound power level	H	dB(A)	64	
	Sound pressure level(3)	H	dB(A)	54	
	Dimensions	WxHxD	mm	760x545x245	
	Net Weight		kg	36	
	Package dimensions	WxHxD	mm	880x610x310	
	Packaged weight		kg	39	
	Units per pallet		Units	12 units per pallet	
	Stacking height		units	3 levels	
	Refrigerant type			R410A	
	Scharg		kg(7.5m)	0.85	
	Additional charge			No need	
	Connections between units	Liquid line	In.(mm)	1/4"(6.35)	
		Suction line	In.(mm)	3/8"(9.53)	
		Max.tubing length	m.	Max.15	
		Max.height difference	m.	Max. 10	
Operation control type				Remote control	
Heating elements (Option)			kW		
Others					

(1) Airflow in ducted units; at nominal external static pressure.
(2) Sound power in ducted units is measured at air discharge.
(3) Sound pressure level measured at 1-meter distance from unit.
(4) Rating conditions in accordance to ISO 5151 and ISO 13253 (for ducted units).

2.2 Delta 25 DCI / DCR 35 60Hz R410A

			Units	Cooling	Heating
Model Indoor Unit				**DELTA 35 DCI**	
Model Outdoor Unit				**DCR 35 R410A**	
Installation Method of Pipe				Flared	
Characteristics			Units	Cooling	Heating
Capacity (4)			Btu/hr	11940(3410-13650)	11940(4090-15010)
			kW	3.5(1.0-4.0)	3.5(1.2-4.4)
Power input (4)			kW	1.03(0.30-1.25)	0.96(0.36-1.25)
EER (Cooling) or COP(Heating) (4)			W/W	3.40	3.64
Energy efficiency class				A	A
Power supply			V	220-240	
			Ph	1	
			Hz	**60**	
Rated current			A	4.6	4.3
Power factor				0.97	0.97
Prated (IDU)			W	30	
Prated (IDU+ODU)			W	1500	
Starting current			A	10.5	
Circuit breaker rating			A	15	
INDOOR	Fan type & quantity			Crossflow x 1	
INDOOR	Fan speeds	H/M/L	RPM	1200/1000/850	
INDOOR	Air flow (1)	H/M/L	m3/hr	550/450/350	
INDOOR	External static pressure	Min	Pa	0	
INDOOR	Sound power level (2)	H/M/L	dB(A)	56/50/46	
INDOOR	Sound pressure level(3)	H/M/L	dB(A)	39/33/29	
INDOOR	Moisture removal		l/hr	1.5	
INDOOR	Condenstate drain tube I.D		mm	16	
INDOOR	Dimensions	WxHxD	mm	840x250x185	
INDOOR	Net Weight		kg	8	
INDOOR	Package dimensions	WxHxD	mm	900x310x248	
INDOOR	Packaged weight		kg	11	
INDOOR	Units per pallet		units	32 units per pallet	
INDOOR	Stacking height		units	8 levels	
OUTDOOR	Refrigerant control			EEV	
OUTDOOR	Compressor type,model			Rotary,Panasonic 5RS102XAB	
OUTDOOR	Fan type & quantity			Propeller(direct) x 1	
OUTDOOR	Fan speeds	H	RPM	830	
OUTDOOR	Air flow	H	m3/hr	1460	
OUTDOOR	Sound power level	H	dB(A)	65	
OUTDOOR	Sound pressure level(3)	H	dB(A)	55	
OUTDOOR	Dimensions	WxHxD	mm	760x545x245	
OUTDOOR	Net Weight		kg	37	
OUTDOOR	Package dimensions	WxHxD	mm	880x610x310	
OUTDOOR	Packaged weight		kg	40	
OUTDOOR	Units per pallet		Units	12 units per pallet	
OUTDOOR	Stacking height		units	3 levels	
OUTDOOR	Refrigerant type			R410A	
OUTDOOR	Scharg		kg(7.5m)	1.0	
OUTDOOR	Additional charge			No need	
OUTDOOR	Connections between units	Liquid line	In.(mm)	1/4"(6.35)	
OUTDOOR	Connections between units	Suction line	In.(mm)	3/8"(9.53)	
OUTDOOR	Connections between units	Max.tubing length	m.	Max.15	
OUTDOOR	Connections between units	Max.height difference	m.	Max. 10	
Operation control type				Remote control	
Heating elements (Option)			kW	No	
Others					

(1)Airflow in ducted units; at nominal external static pressure.
(2)Sound power in ducted units is measured at air discharge.
(3)Sound pressure level measured at 1-meter distance from unit.
(4)Rating conditions in accordance to ISO 5151 and ISO 13253 (for ducted units).

CONTENTS

2.3 Delta 50 DCI / DCR 50 60Hz R410A

Model Indoor Unit				**DELTA 50 DCI**	
Model Outdoor Unit				**DCR 50 R410A**	
Installation Method of Pipe				Flared	
Characteristics			Units	Cooling	Heating
Capacity (1)			Btu/hr	17060(4780-18770)	18080(5460-20130)
			kW	5.0(1.4-5.5)	5.3(1.6-5.9)
Power input (1)			kW	1.56	1.55
EER (Cooling) or COP(Heating) (1)			W/W	3.21	3.42
Energy efficiency class				A	B
Power supply			V/Ph/Hz	220-240V/Single/60Hz	
Rated current			A	7.0	6.9
Starting current			A	10.5	
Circuit breaker rating			A	20	
INDOOR	Fan type & quantity			Crossflow x 1	
	Fan speeds	H/M/L	RPM	1230/1100/900	
	Air flow (2)	H/M/L	m3/hr	720/620/480	
	External static pressure	Min-Max	Pa	0	
	Sound power level (3)	H/M/L	dB(A)	56/54/47	
	Sound pressure level (4)	H/M/L	dB(A)	44/41/34	
	Moisture removal		l/hr	2	
	Condensate drain tube I.D		mm	16	
	Dimensions	WxHxD	mm	900x205x295	
	Weight		kg	11	
	Package dimensions	WxHxD	mm	960x270x360	
	Packaged weight		kg	14	
	Units per pallet		units	24 units per pallet	
	Stacking height		units	8 levels	
OUTDOOR	Refrigerant control			EEV	
	Compressor type, model			Scroll, PANASONIC 5CS130XCC03	
	Fan type & quantity			Propeller(direct) x 1	
	Fan speeds	H/L	RPM	920	
	Air flow	H/L	m3/hr	2160	
	Sound power level	H/L	dB(A)	63	
	Sound pressure level (4)	H/L	dB(A)	53	
	Dimensions	WxHxD	mm	795x290x610	
	Weight		kg	38	
	Package dimensions	WxHxD	mm	945x395x655	
	Packaged weight		kg	41	
	Units per pallet		Units	9 units per pallet	
	Stacking height		units	3 levels	
	Refrigerant type			R410A	
	Refrigerant chargless distance		kg/m	1.26kg/7.5m	
	Additional charge per 1 meter		g/m	No need	
	Connections between units	Liquid line	In.(mm)	1/4"(6.35)	
		Suction line	In.(mm)	1/2"(12.7)	
		Max.tubing length	m.	Max.15	
		Max.height difference	m.	Max. 10	
Operation control type				Remote control	
Heating elements			kW		
Others					

(1)Airflow in ducted units; at nominal external static pressure.
(2)Sound power in ducted units is measured at air discharge.
(3)Sound pressure level measured at 1-meter distance from unit.
(4)Rating conditions in accordance to ISO 5151 and ISO 13253 (for ducted units).

3. RATING CONDITIONS

Rating conditions in accordance with ISO 5151 and ISO 13253 (for ducted units).

Cooling:
Indoor: 27°C DB 19°C WB
Outdoor: 35 °C DB

Heating:
Indoor: 20°C DB
Outdoor: 7°C DB 6°C WB

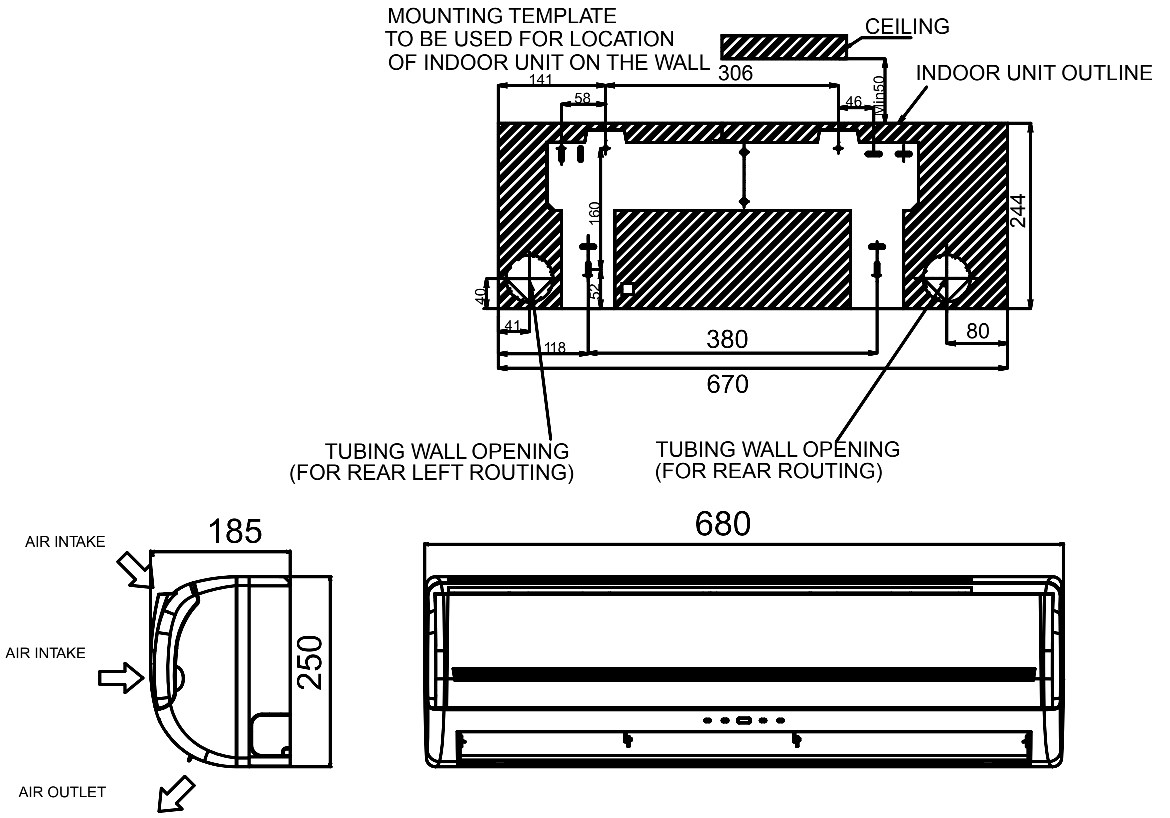
3.1 Operating Limits

3.1.1 R410A

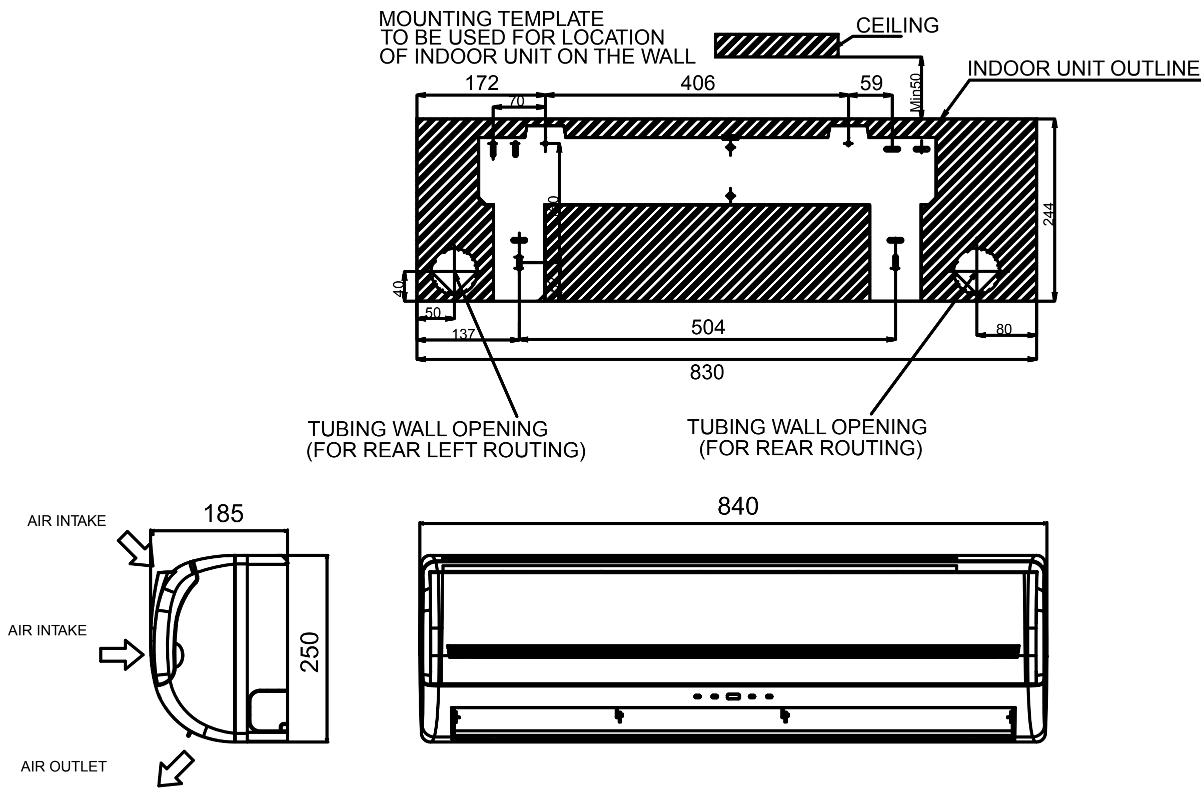
		Indoor	Outdoor
Cooling	**Upper limit**	32°C DB 23°C WB	46°C DB
	Lower limit	21°C DB 15°C WB	-10°C DB
Heating	**Upper limit**	27°C DB	24°C DB 18°C WB
	Lower limit	10°C DB	-15°C DB -16°C WB
Voltage		1PH 198 – 264 V / **60Hz**	

4. OUTLINE DIMENSIONS

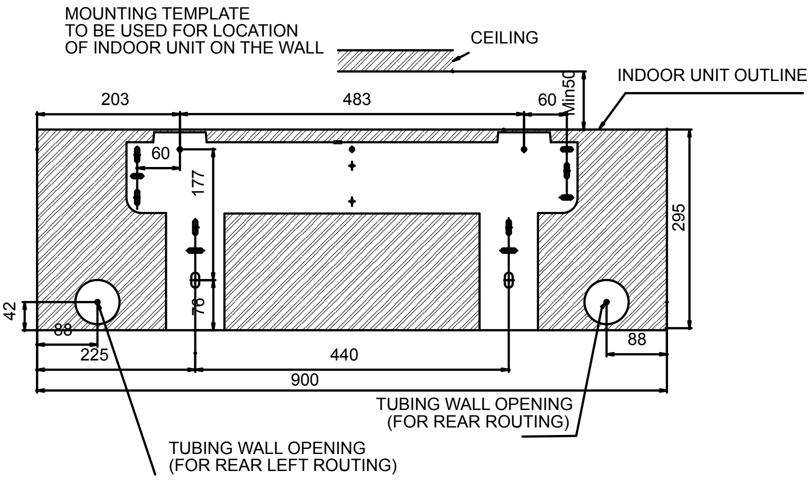
4.1 Indoor Unit: Delta 25 DCI 60Hz

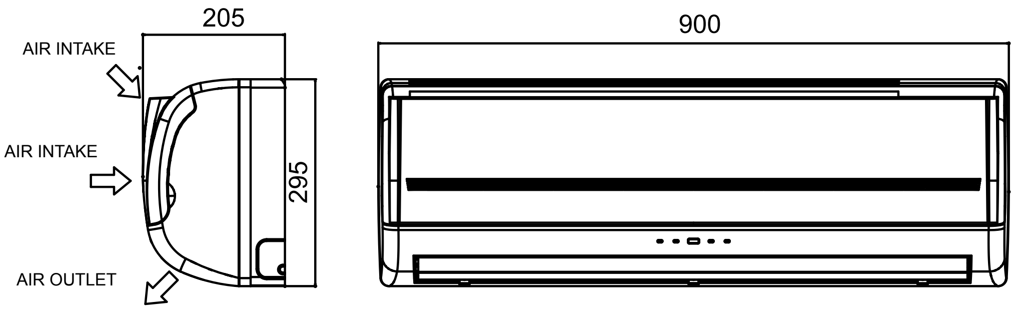


4.2 Indoor Unit: Delta 35 DCI 60Hz

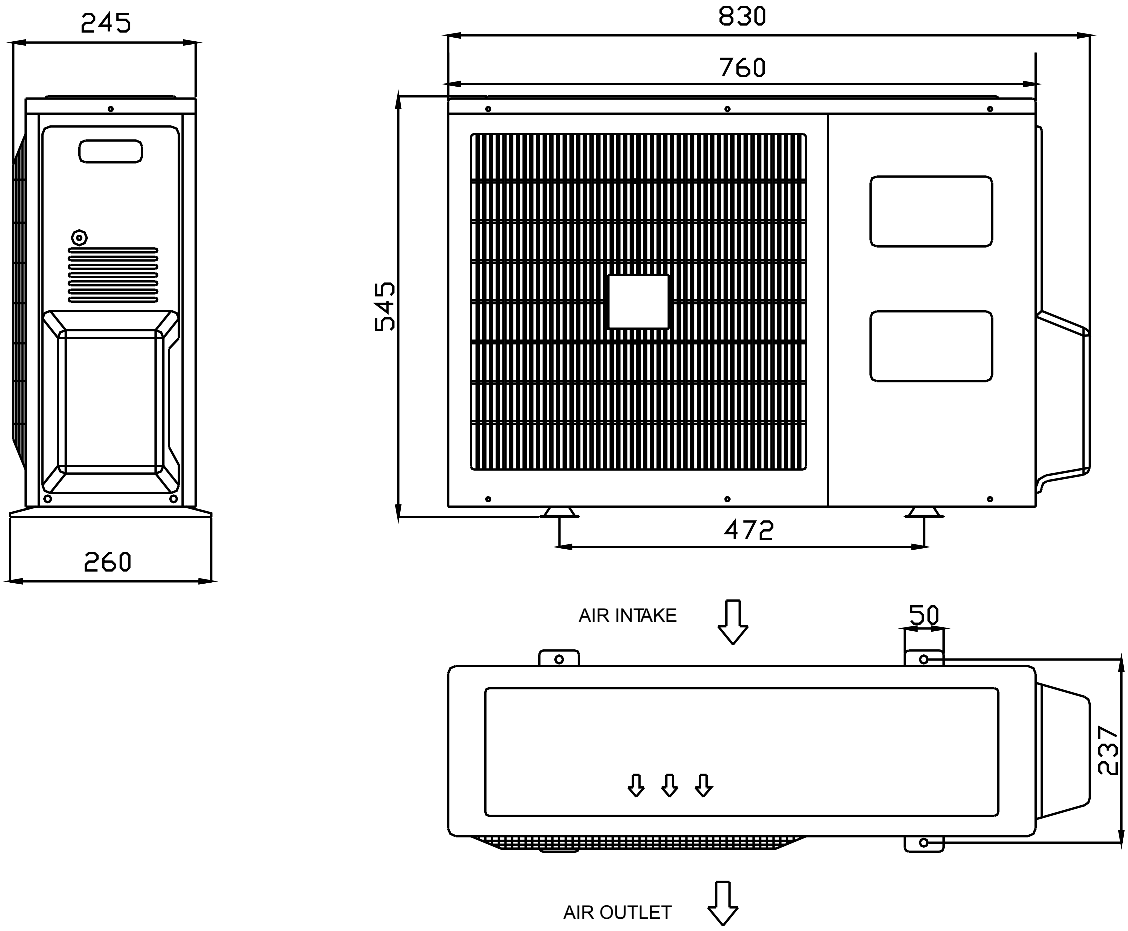


4.3 Indoor Unit: Delta 50 DCI 60Hz

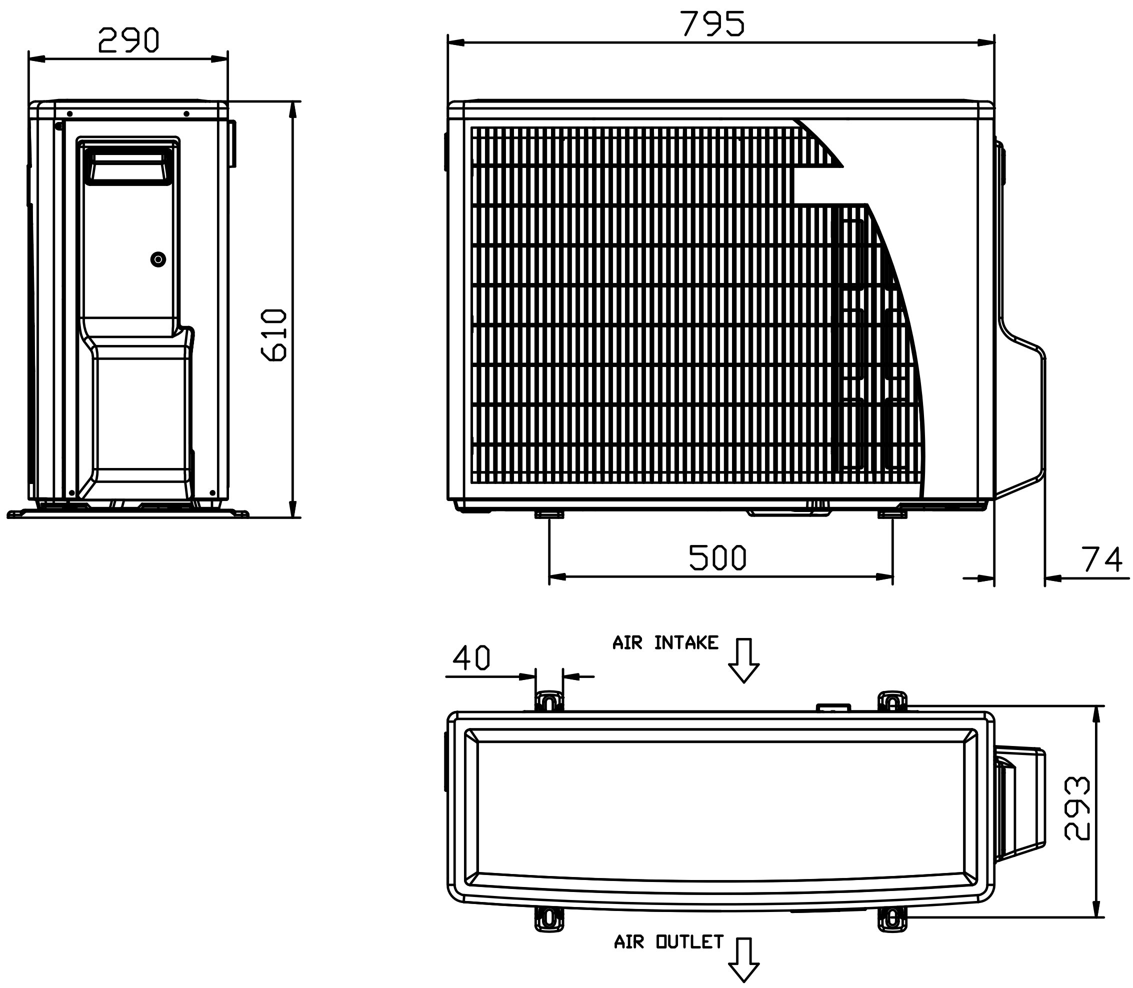




4.4 Outdoor Unit: DCR 25, DCR 35 60Hz



4.5 Outdoor Unit: DCR 50 60Hz



5. PERFORMANCE DATA

5.1 Delta 25 DCI / DCR 25 60Hz R410A

5.1.1 Cooling Capacity (kW) – Run Mode

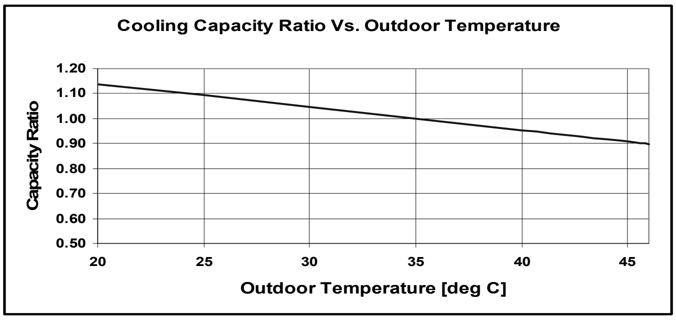
230[V] : Indoor Fan at High Speed.

Entering Air DB OD Coil(°C)	Data	Entering Air WB/DB ID Coil(°C)				
		15/21	17/24	19/27	21/29	23/32
15	TC	2.55	2.70	2.83	2.95	3.05
	SC	1.76	1.87	1.97	1.92	1.95
	PI	0.52	0.52	0.52	0.52	0.52
20	TC	2.53	2.68	2.80	2.93	3.03
	SC	1.80	1.91	2.02	1.96	2.01
	PI	0.56	0.56	0.57	0.57	0.57
25	TC	2.43	2.60	2.75	2.88	2.98
	SC	1.71	1.83	1.94	1.90	1.95
	PI	0.60	0.61	0.62	0.62	0.62
30	TC	2.28	2.45	2.65	2.75	2.85
	SC	1.63	1.76	1.90	1.86	1.93
	PI	0.65	0.66	0.67	0.68	0.68
35	TC	2.10	2.28	**2.50**	2.63	2.73
	SC	1.53	1.67	**1.82**	1.80	1.87
	PI	0.71	0.72	**0.73**	0.74	0.74
40	TC	1.90	2.08	2.30	2.43	2.53
	SC	1.42	1.57	1.72	1.69	1.78
	PI	0.76	0.77	0.79	0.80	0.80
46	TC	1.65	1.83	2.05	2.18	2.28
	SC	1.29	1.43	1.61	1.58	1.66
	PI	0.84	0.85	0.86	0.88	0.88

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.1.2 Capacity Correction Factors



5.1.3 Heating Capacity (kW) - Run Mode

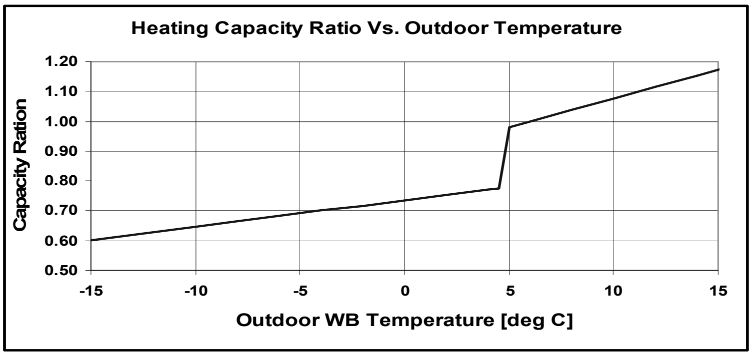
230[V] : Indoor Fan at High Speed.

ENTERING WB OD COIL(°C)	ENTERING AIR DB ID COIL(°c)					
	15		20		25	
	TH	PI	TH	PI	TH	PI
-10	1.31	0.55	1.26	0.59	1.21	0.62
-7	1.41	0.57	1.36	0.60	1.31	0.63
-2	1.50	0.57	1.45	0.61	1.40	0.64
2	1.83	0.60	1.75	0.64	1.68	0.68
6	2.58	0.65	**2.50**	**0.69**	2.41	0.73
10	2.80	0.68	2.73	0.73	2.65	0.78
15	3.03	0.71	2.95	0.77	2.88	0.81
20	3.19	0.73	3.11	0.79	3.03	0.86

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.1.4 Capacity Correction Factors



5.2 Delta 35 DCI / DCR 35 60Hz R410A

5.2.1 Cooling Capacity (kW) – Run Mode

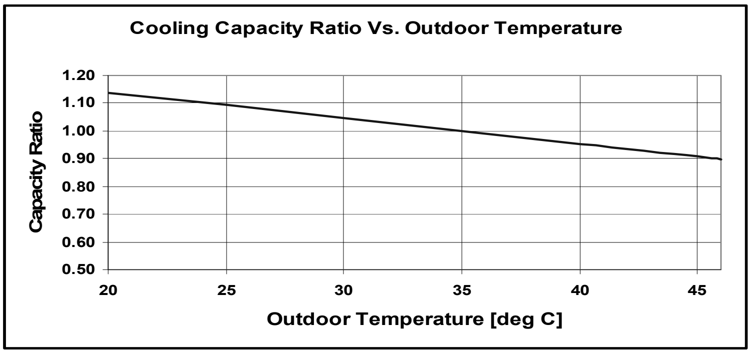
230[V] : Indoor Fan at High Speed.

Entering Air DB OD Coil(°C)	Data	Entering Air WB/DB ID Coil(°C)				
		15/21	17/24	19/27	21/29	23/32
15	TC	3.57	3.78	3.96	4.13	4.27
	SC	2.40	2.54	2.68	2.62	2.66
	PI	0.73	0.73	0.73	0.74	0.74
20	TC	3.54	3.75	3.92	4.10	4.24
	SC	2.52	2.68	2.83	2.75	2.81
	PI	0.79	0.79	0.80	0.80	0.81
25	TC	3.40	3.64	3.85	4.03	4.17
	SC	2.33	2.50	2.64	2.59	2.66
	PI	0.85	0.86	0.87	0.87	0.88
30	TC	3.19	3.43	3.71	3.85	3.99
	SC	2.21	2.39	2.58	2.53	2.63
	PI	0.92	0.93	0.95	0.95	0.96
35	TC	2.94	3.19	**3.50**	3.68	3.82
	SC	2.09	2.27	**2.48**	2.45	2.55
	PI	1.00	1.01	**1.03**	1.04	1.04
40	TC	2.66	2.91	3.22	3.40	3.54
	SC	1.94	2.13	2.35	2.31	2.42
	PI	1.08	1.09	1.11	1.12	1.13
46	TC	2.31	2.56	2.87	3.05	3.19
	SC	1.76	1.95	2.20	2.16	2.26
	PI	1.18	1.20	1.22	1.24	1.25

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.2.2 Capacity Correction Factors



5.3.3 Heating Capacity (kW) - Run Mode

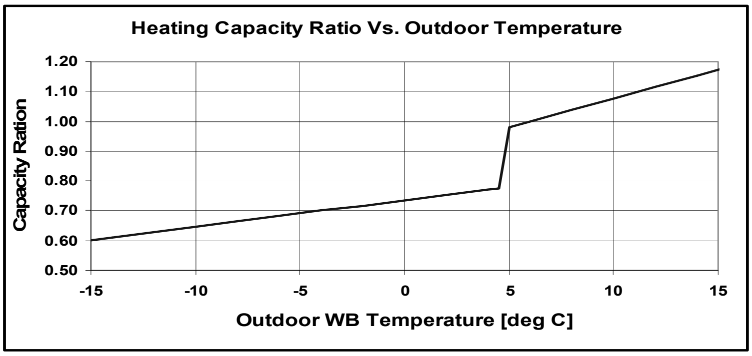
230[V] : Indoor Fan at High Speed.

ENTERING WB OD COIL(°C)	ENTERING AIR DB ID COIL(°c)					
	15		20		25	
	TH	PI	TH	PI	TH	PI
-10	1.84	0.77	1.77	0.82	1.70	0.86
-7	1.98	0.79	1.91	0.83	1.84	0.88
-2	2.10	0.80	2.03	0.84	1.96	0.89
2	2.56	0.84	2.45	0.89	2.35	0.94
6	3.61	0.90	**3.50**	**0.96**	3.38	1.02
10	3.92	0.95	3.82	1.01	3.71	1.08
15	4.24	0.99	4.13	1.07	4.03	1.13
20	4.46	1.02	4.36	1.10	4.24	1.19

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

5.3.4 Capacity Correction Factors



5.4 Delta 50 DCI / DCR 50 60Hz R410A

5.4.1 Cooling Capacity (kW) – Run Mode

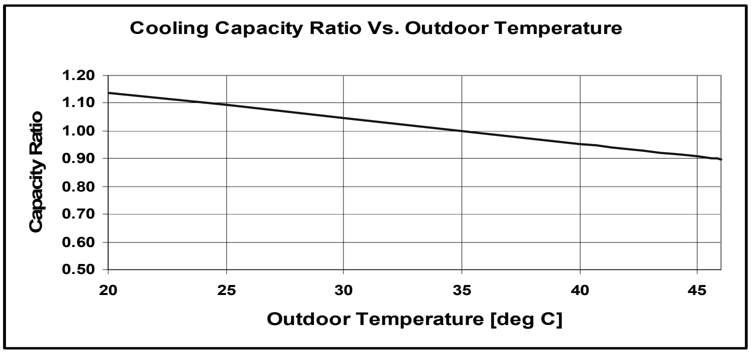
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB/WB TEMPERATURE [°C] 22/15	24/17	27/19	29/21	32/23
-10 - 20 (protection range)	TC	80 - 110 % of nominal				
	SC	80 - 105 % of nominal				
	PI	25 - 50 % of nominal				
25	TC	4.93	5.22	5.51	5.80	6.09
	SC	3.68	3.73	3.79	3.84	3.90
	PI	1.18	1.21	1.23	1.26	1.29
30	TC	4.67	4.96	5.25	5.54	5.83
	SC	3.53	3.59	3.64	3.70	3.75
	PI	1.34	1.37	1.40	1.42	1.45
35	TC	4.42	4.71	**5.00**	5.29	5.58
	SC	3.39	3.45	**3.50**	3.55	3.61
	PI	1.51	1.53	**1.56**	1.59	1.61
40	TC	4.17	4.46	4.75	5.04	5.33
	SC	3.25	3.30	3.36	3.41	3.47
	PI	1.67	1.70	1.72	1.75	1.78
46	TC	3.86	4.15	4.44	4.73	5.02
	SC	3.08	3.13	3.18	3.24	3.29
	PI	1.87	1.89	1.92	1.95	1.97

LEGEND

TC – Total Cooling Capacity, kW
SC – Sensible Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OD – Outdoor

5.4.2 Capacity Correction Factors



5.4.3 Heating Capacity (kW) - Run Mode

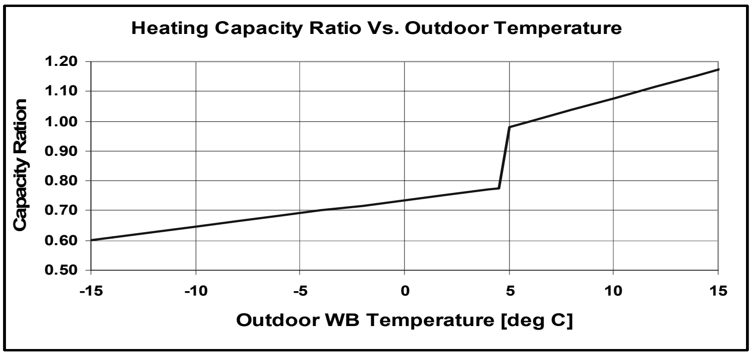
230[V] : Indoor Fan at High Speed.

OD COIL ENTERING AIR DB/WB TEMPERATURE [°C]	DATA	ID COIL ENTERING AIR DB TEMPERATURE [°C]		
		15	20	25
-15/-16	TC	3.37	3.14	2.90
	PI	0.93	1.02	1.12
-10/-12	TC	3.76	3.52	3.28
	PI	1.12	1.22	1.31
-7/-8	TC	4.04	3.81	3.57
	PI	1.26	1.36	1.45
-1/-2	TC	4.18	3.95	3.71
	PI	1.34	1.43	1.53
2/1	TC	4.28	4.04	3.81
	PI	1.38	1.48	1.57
7/6	TC	5.54	**5.30**	5.06
	PI	1.46	**1.55**	1.64
10/9	TC	5.84	5.60	5.37
	PI	1.54	1.64	1.73
15/12	TC	6.14	5.91	5.67
	PI	1.63	1.72	1.82
15-24	TC	85 - 105 % of nominal		
(Protection Range)	PI	80 - 120 % of nominal		

LEGEND

TC – Total Heating Capacity, kW
PI – Power Input, kW
WB – Wet Bulb Temp., (°C)
DB – Dry Bulb Temp., (°C)
ID – Indoor
OU – Outdoor

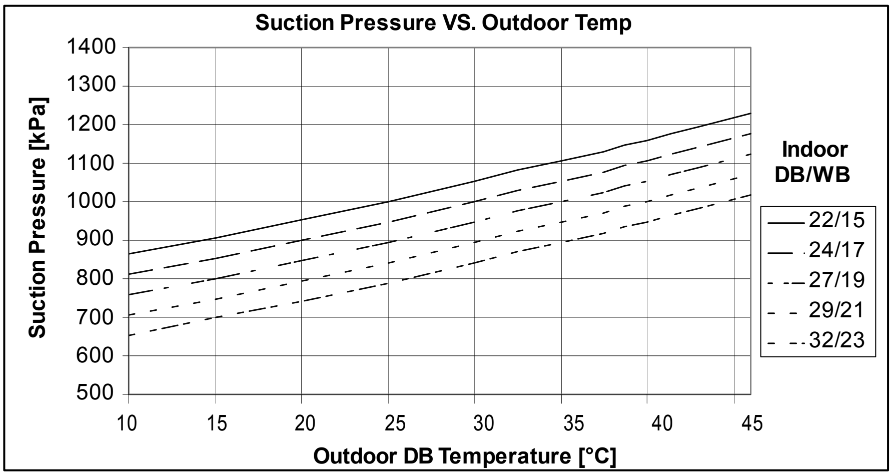
5.4.4 Capacity Correction Factors

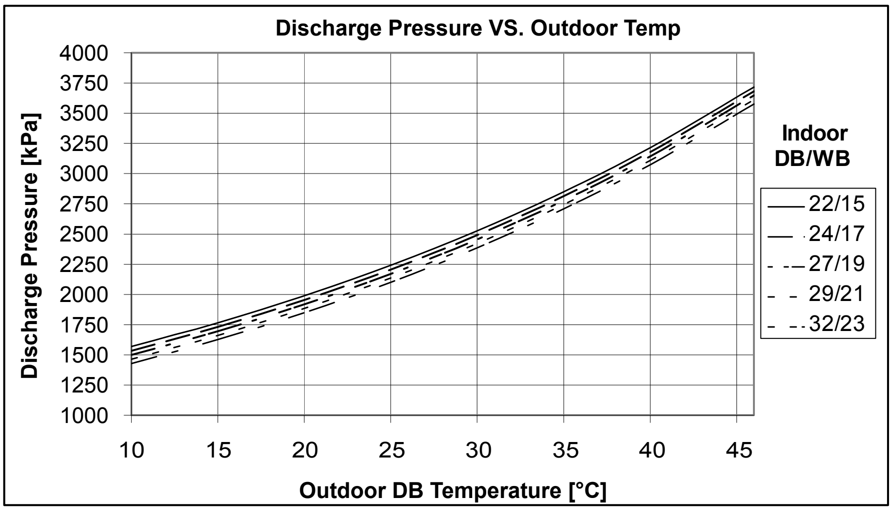


5.5 PRESSURE CURVES

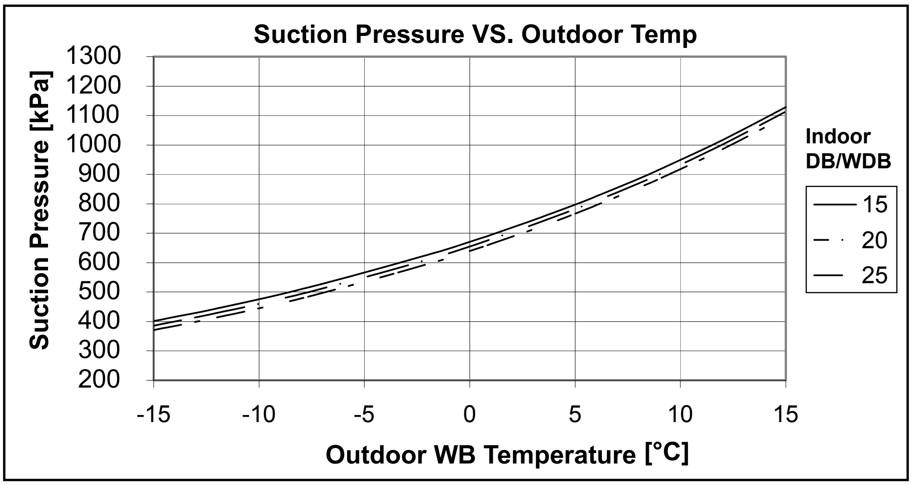
5.5.1 Delta 25 DCI / DCR 25 60Hz R410A

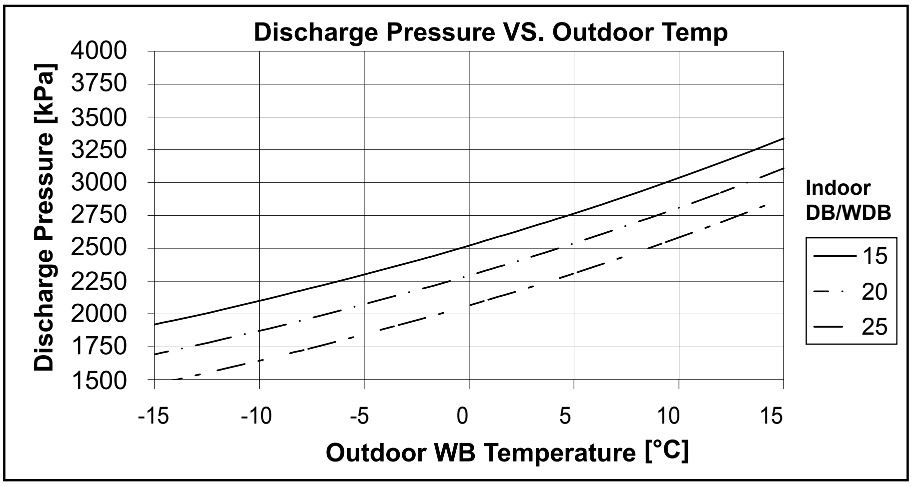
5.5.1.1 Cooling => Test Mode





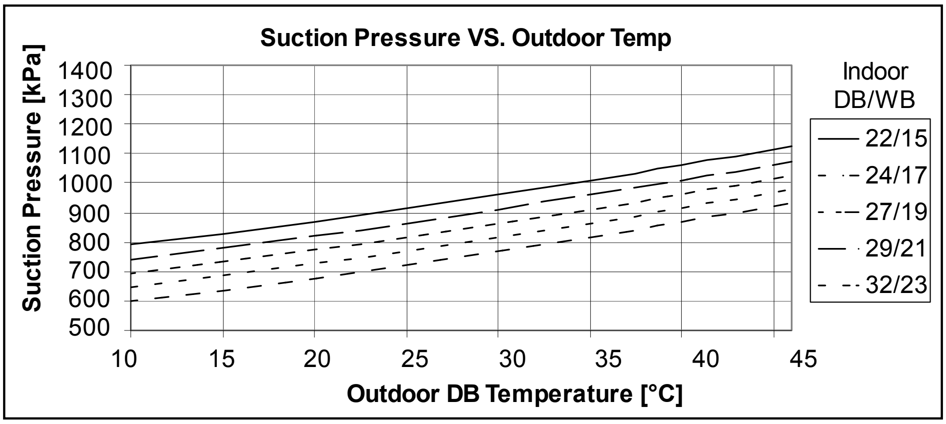
5.5.1.2 Heating => Test Mode

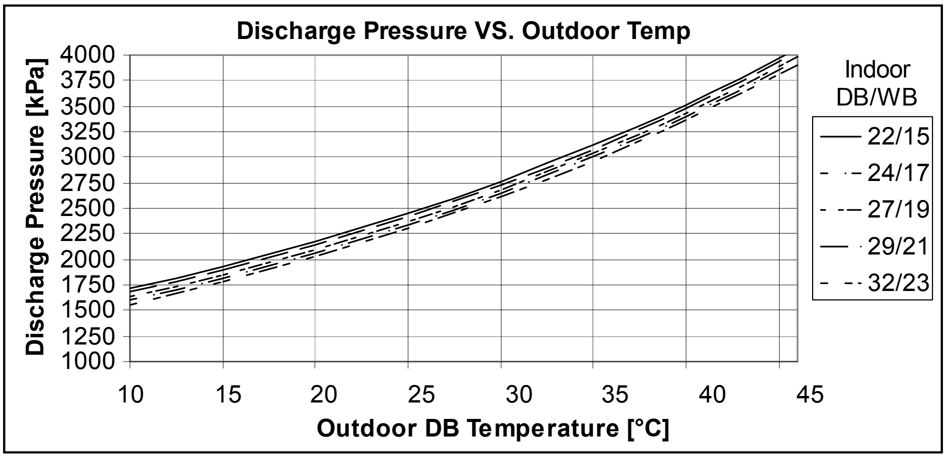




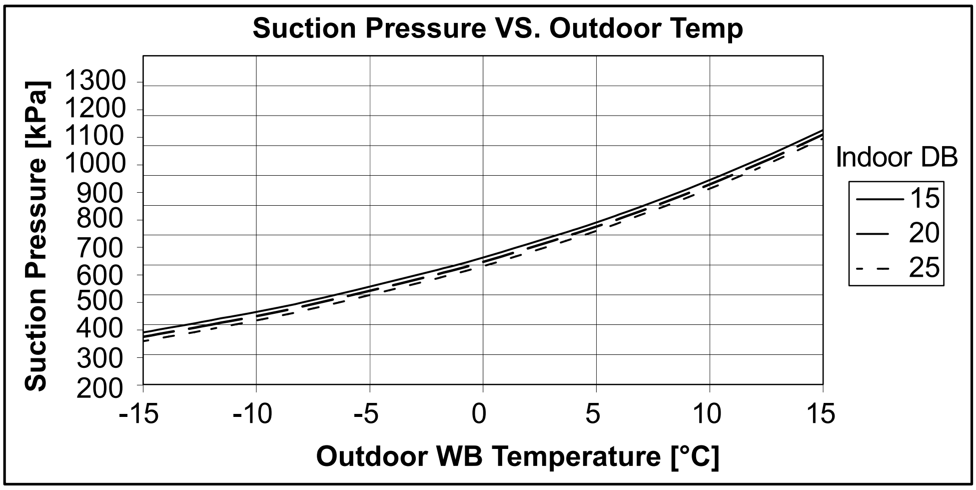
5.5.2 Delta 35 DCI / DCR 35 60Hz R410A

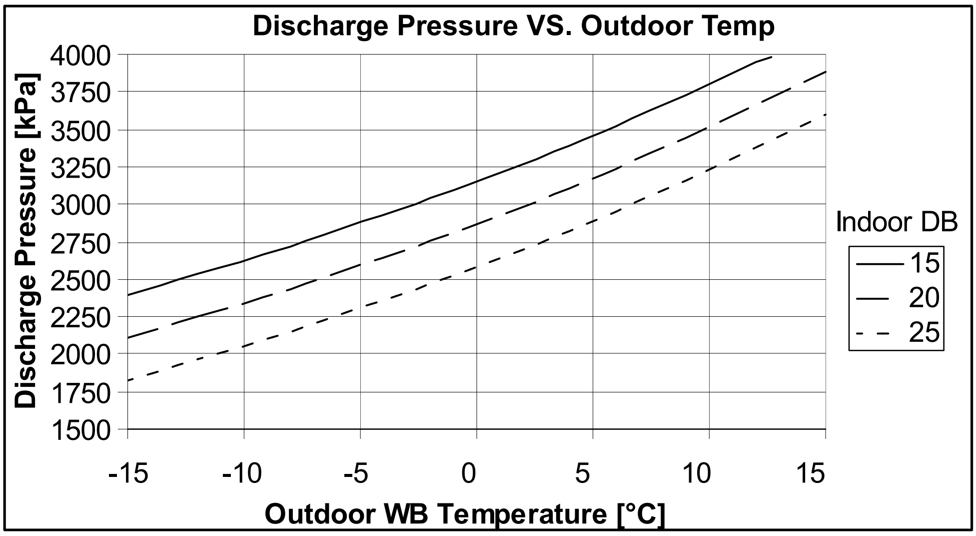
5.5.2.1 Cooling => Test Mode





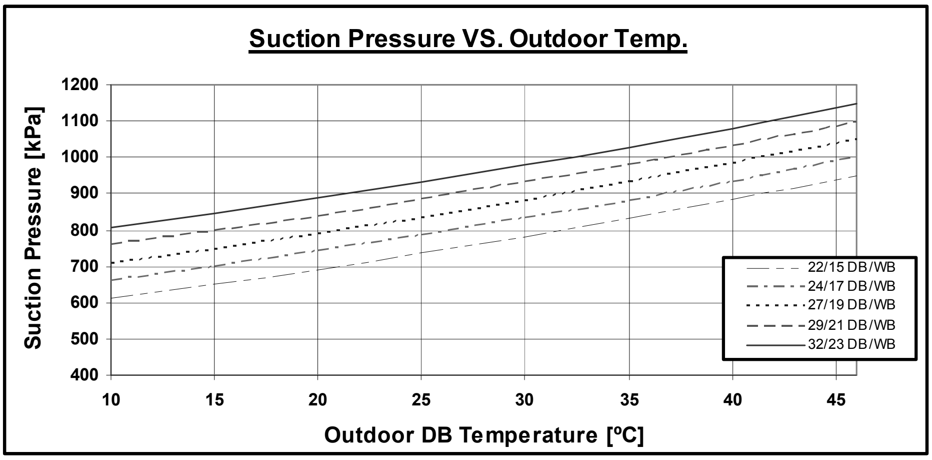
5.5.2.2 Heating =>Test Mode

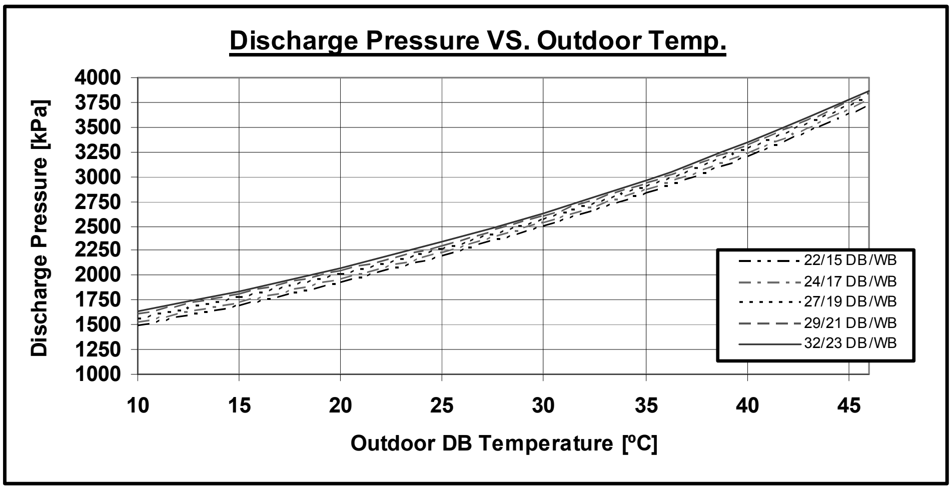




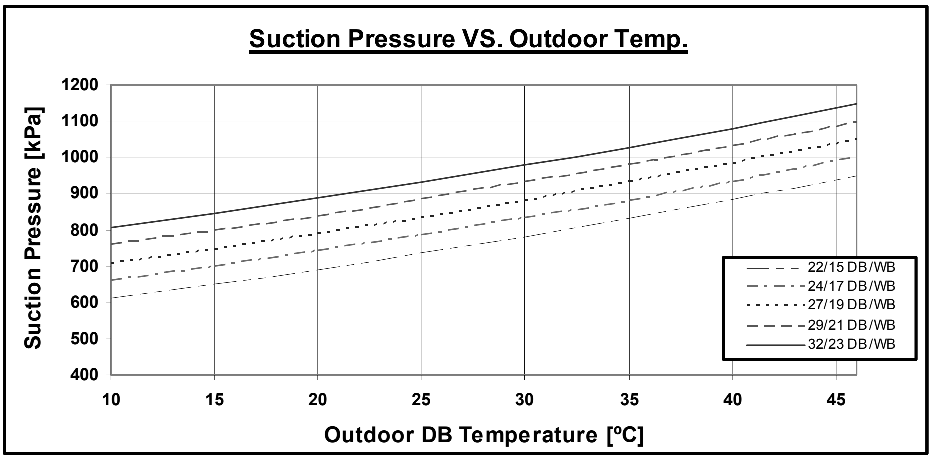
5.5.3 Delta 50 DCI / DCR 50 60Hz R410A

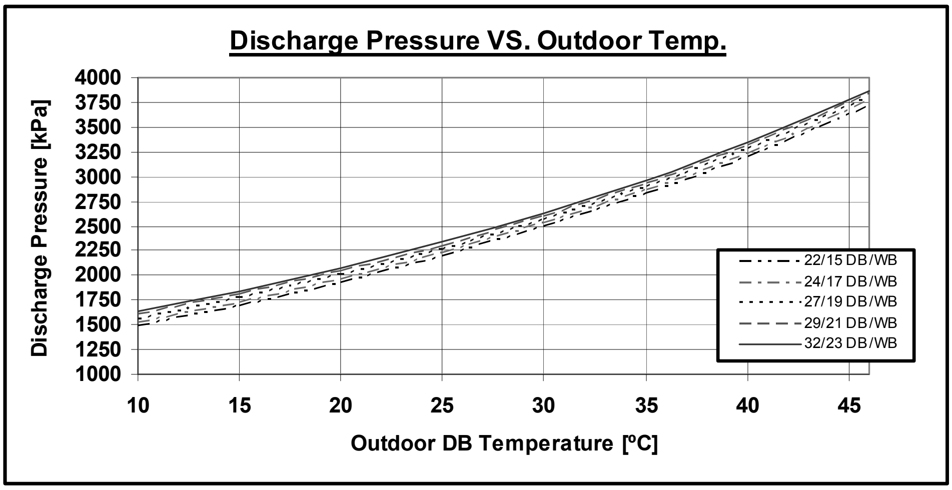
5.5.3.1 Cooling => Test Mode





5.5.3.2 Heating =>Test Mode





6. SOUND LEVEL CHARACTERISTICS

6.1 Sound Pressure Level

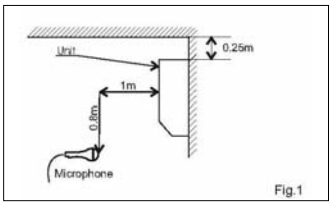
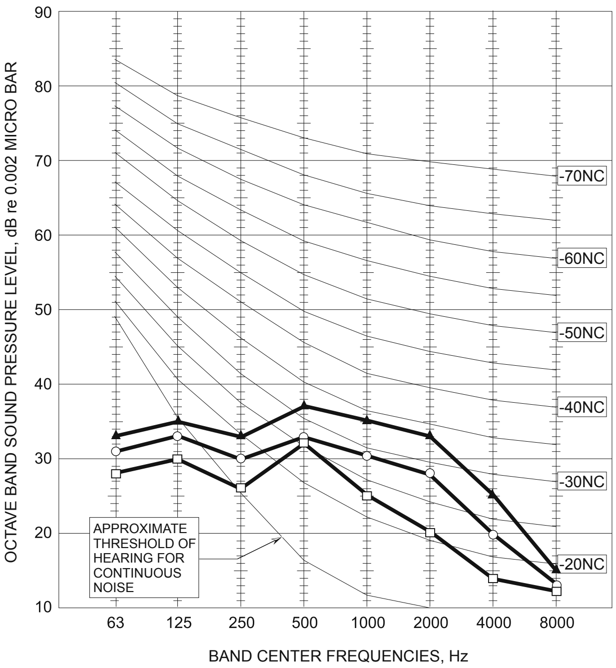


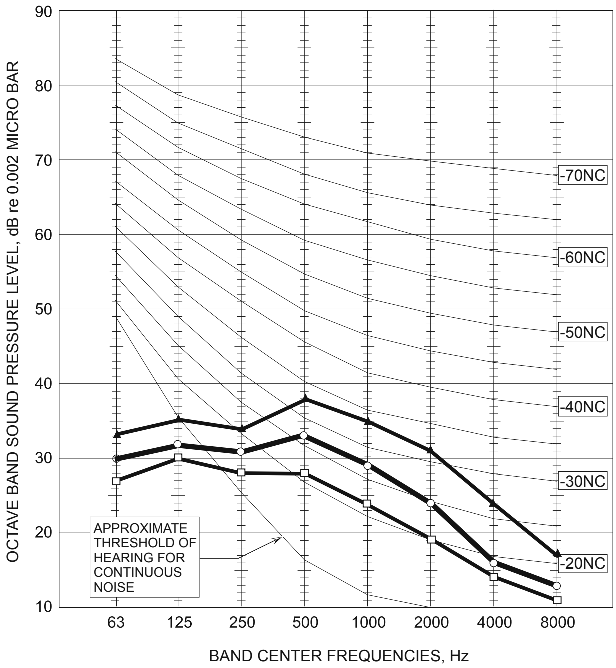
Figure 1. Wall Mounted

6.2 Sound Pressure Level Spectrum (Measured as Figure 1)

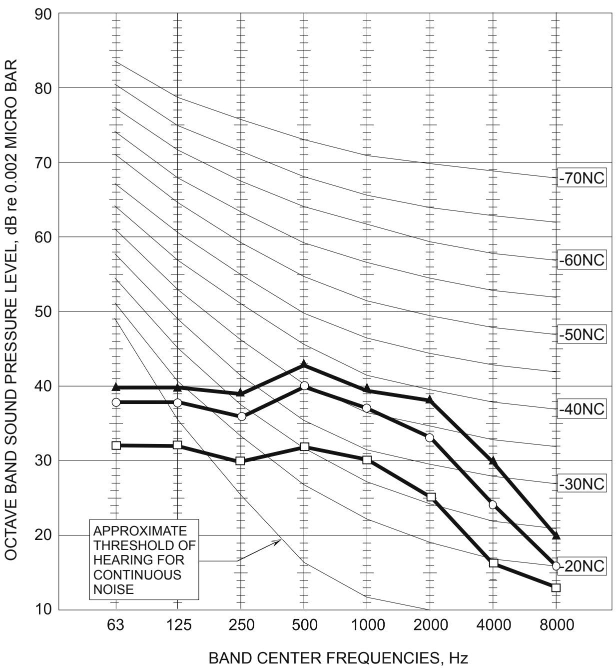
Delta 25 60Hz DCI



Delta 35 60Hz DCI



Delta 50 60Hz DCI



FAN SPEED	LINE
HI	─▲─
ME	─○─
LO	─□─

6.3 Outdoor units

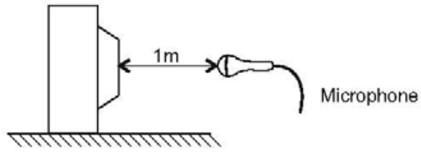
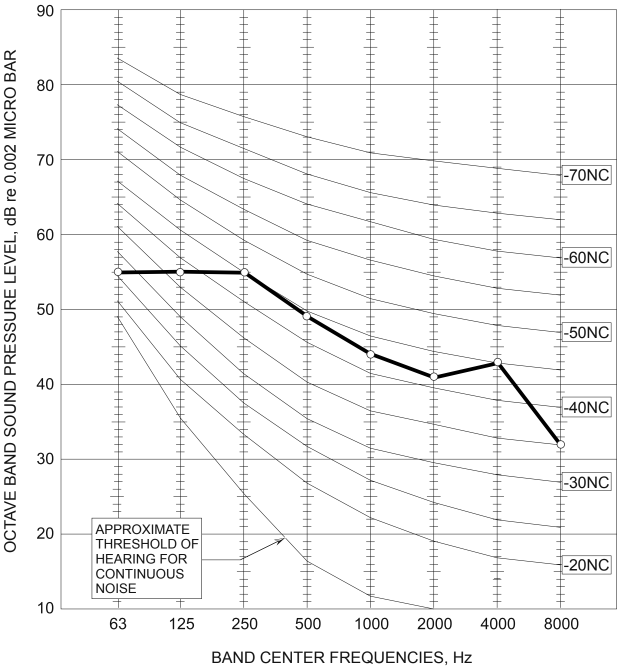


Fig.5

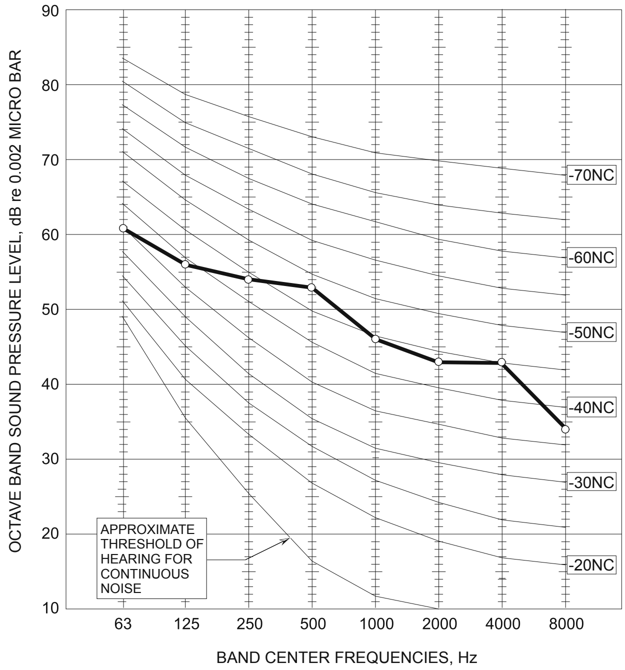
Microphone Distance from Unit

6.4 **Sound Pressure Level Spectrum** (Measured as Figure 5)

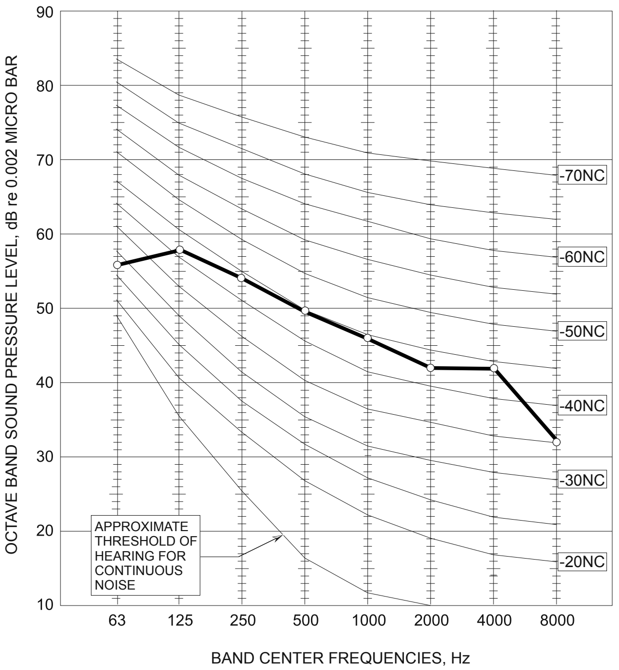
DCR 25 60Hz Cooling



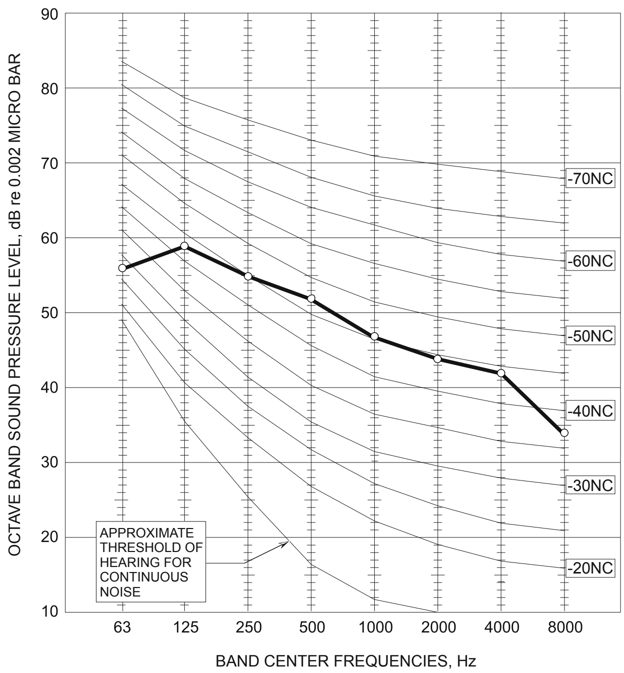
DCR 25 60Hz Heating



DCR 35 60Hz Cooling



DCR 35 60Hz Heating



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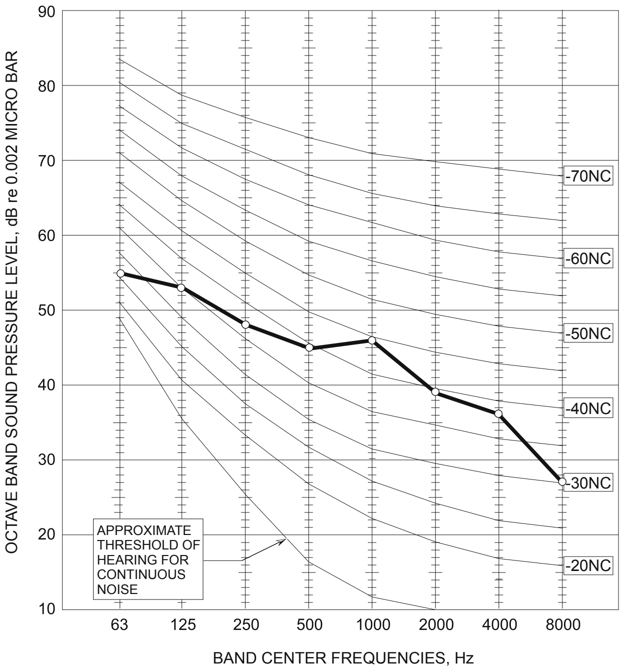
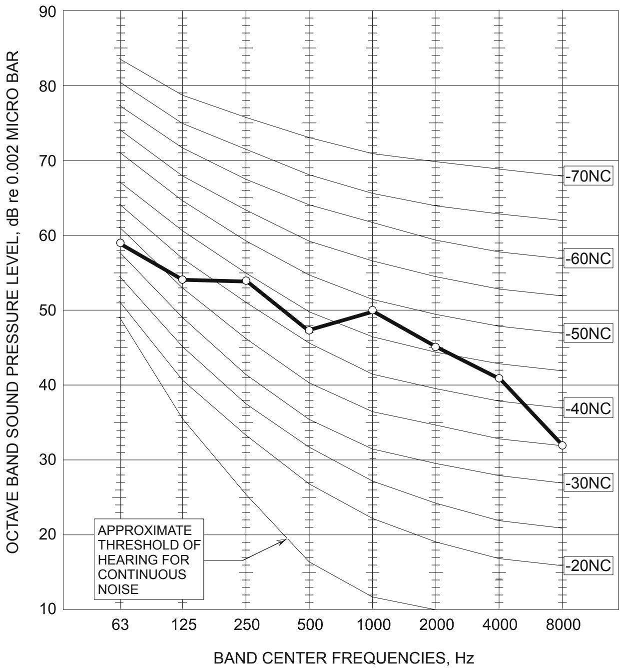
DCR 50 60Hz Cooling



DCR 50 60Hz Heating



7. ELECTRICAL DATA

7.1 Single Phase Units

MODEL	Delta 25 DCI	Delta 35 DCI	Delta 50 DCI
Power Supply	To indoor	To indoor	To indoor
	1PH,220-240V,60Hz	**1PH,220-240V,60Hz**	**1PH,220-240V,60Hz**
Max Current, A	**6.3**	**7.5**	**10.3**
Circuit Breaker,A	**12**	**15**	**20**
Power Supply Wiring No. X Cross Section mm^2	**3x1.0 mm^2**	**3x1.5 mm^2**	**3x1.5 mm^2**
Interconnecting Cable RC Model No. X Cross Section mm^2	**4x1.0 mm^2**	**4x1.5 mm^2**	**5x1.5 mm^2**

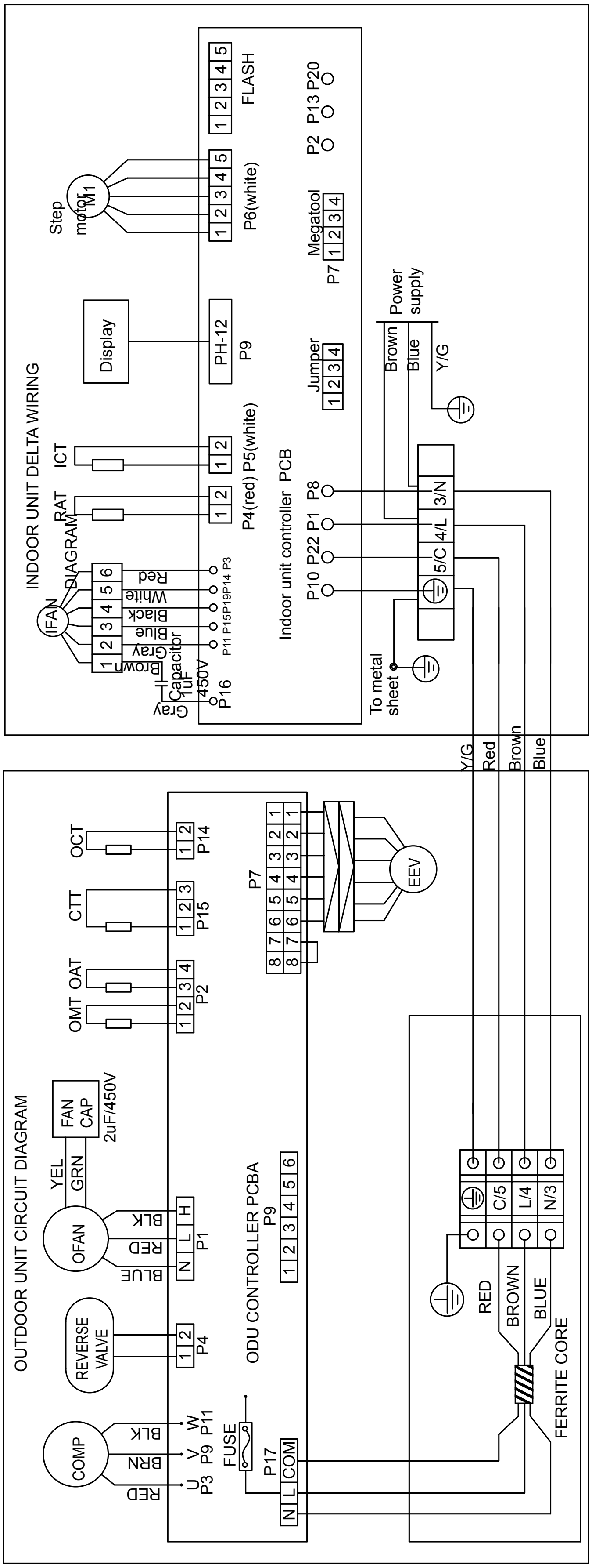
(a) The Inrush current is the current when power is up (charging the DC capacitors of the outdoor unit controller).
(b) Starting current is the current when starting the compressor.

NOTE

Power wiring cord should comply with local laws and electrical regulations requirements

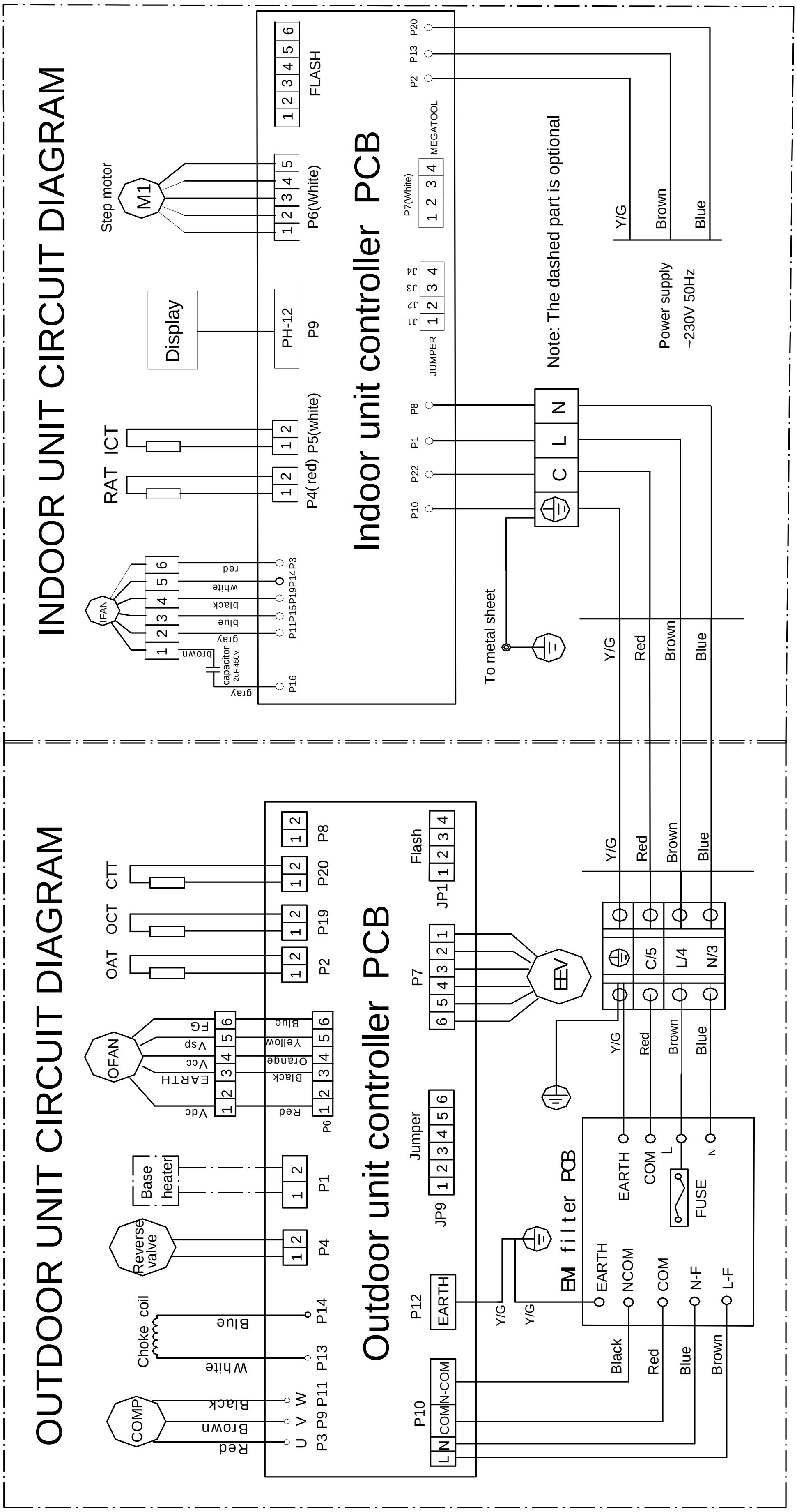
8. WIRING DIAGRAMS

8.1 Delta 25 / DCR 25, Delta 35 / DCR 35



CONTENTS

8.2 Delta 50 / DCR 50



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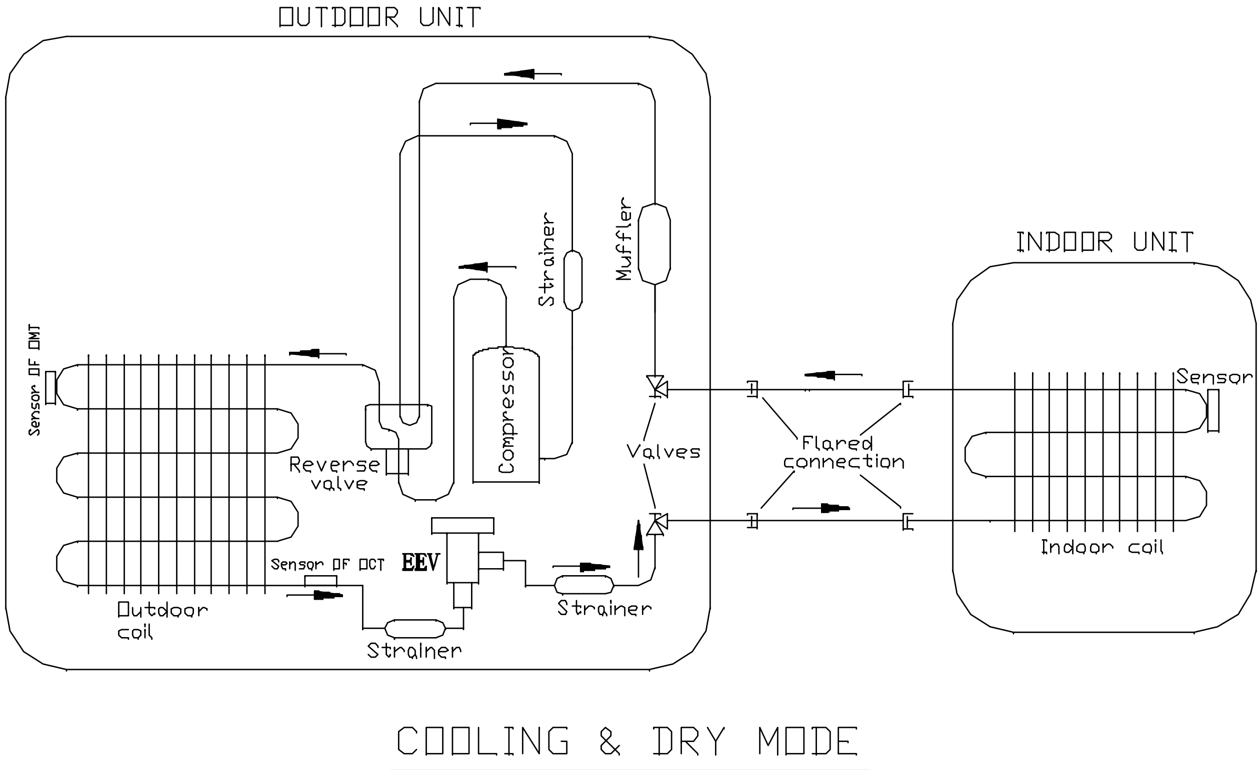
9. REFRIGERATION DIAGRAMS

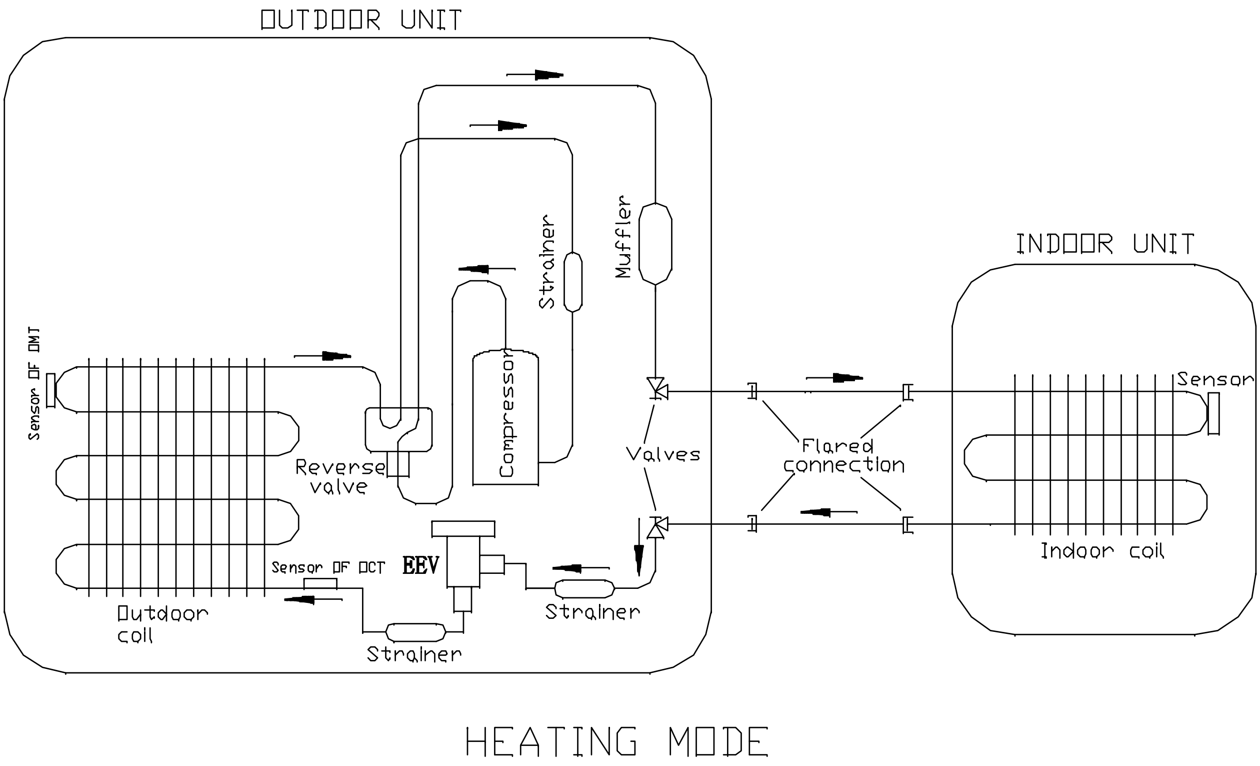
9.1 Heat Pump Models

9.1.1 Delta 25 DCI / DCR 25, Delta 35 DCI / DCR 35

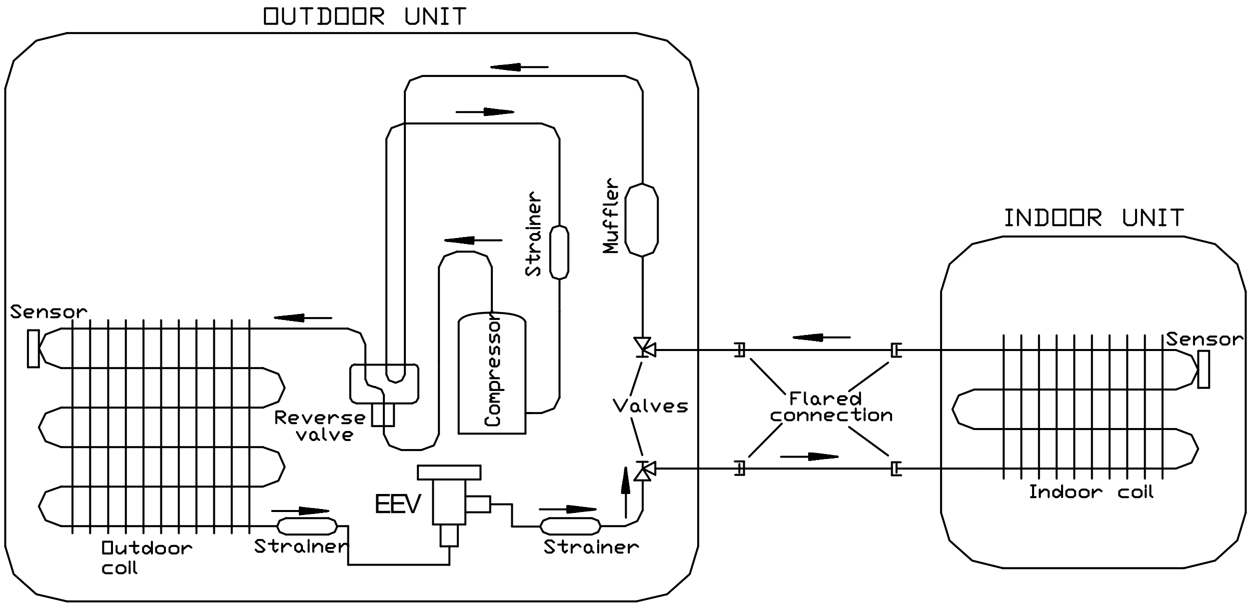
Cooling Mode



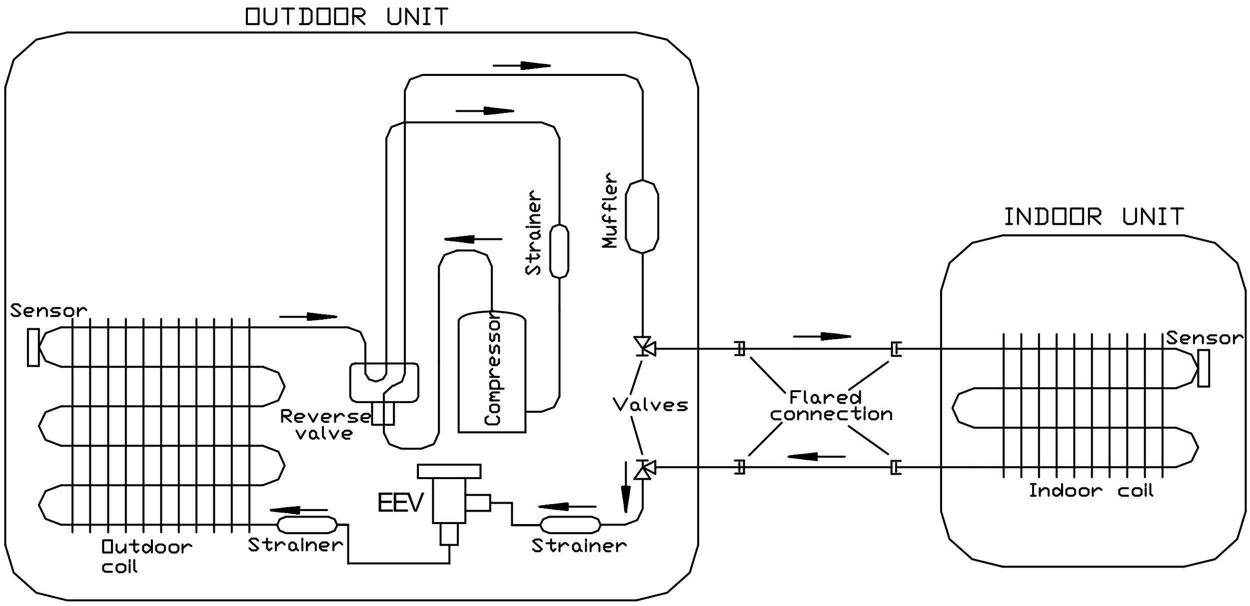
Heating Mode



9.1.2 Delta 50 DCI / DCR 50

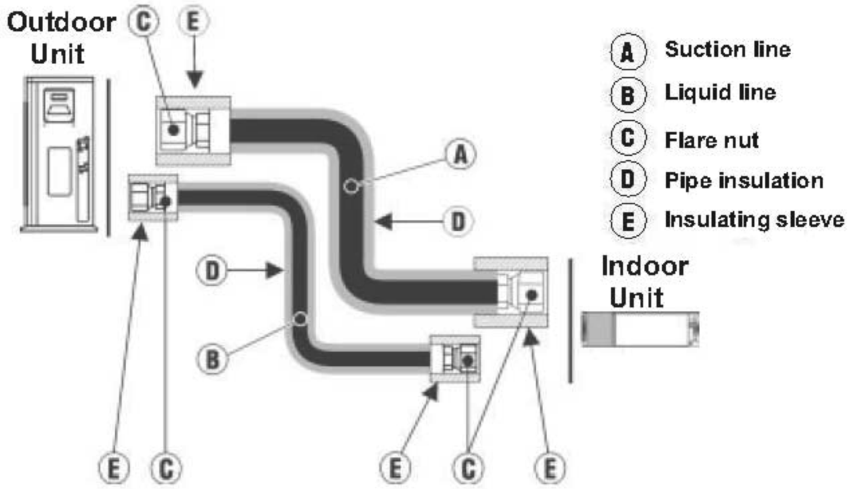


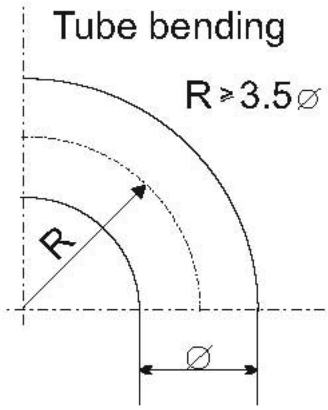
COOLING & DRY MODE

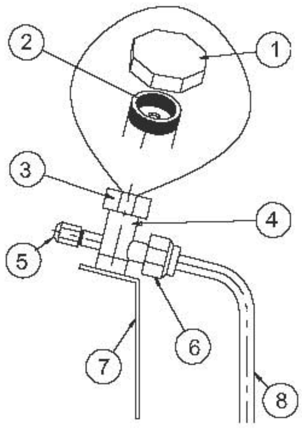


HEATING MODE

10. TUBING CONNECTIONS







TUBE (Inch) / TORQUE (Nm)	¼”	⅜”	½”	⅝”	¾”
Flare Nuts	11-13	40-45	60-65	70-75	80-85
Valve Cap	13-20	13-20	18-25	18-25	40-50
Service Port Cap	11-13	11-13	11-13	11-13	11-13

1. Valve Protection Cap-end
2. Refrigerant Valve Port (use Allen wrench to open/close)
3. Valve Protection Cap
4. Refrigerant Valve
5. Service Port Cap
6. Flare Nut
7. Unit Back Side
8. Copper Tube

11. CONTROL SYSTEM

11.1 General Functions and Operating Rules

The DCI software is fully parametric.All the model dependent parameters are shown in Blue color and with Italic style [*parameter*].

The parameters values are given in the last section of this control logic chapter of the service manual.

11.1.1 System Operation Concept

The control function is divided between indoor and outdoor unit controllers. Indoor unit is the system 'Master', requesting the outdoor unit for cooling/heating capacity supply. The outdoor unit is the system 'Slave' and it must supply the required capacity unless it enters into a protection mode avoiding it from supplying the requested capacity.

The capacity request is transferred via indoor to outdoor communication, and is represented by a parameter called 'NLOAD'. NLOAD is an integer number with values between 0 and 127, and it represents the heat or cool load felt by the indoor unit.

11.1.2 Compressor Frequency Control (NLOAD setting)

The NLOAD setting is done by the indoor unit controller, based on a PI control scheme.
The actual NLOAD to be sent to the outdoor unit controller, is based on the preliminary LOAD calculation, the indoor fan speed, and the power shedding function.

NLOAD limits as a function of indoor fan speed:

Indoor Fan Speed	Maximum NLOAD Cooling	Maximum NLOAD Heating
Low	*Max NLOADIF1C*	127
Medium	*Max NLOADIF2C*	127
High	*Max NLOADIF3C*	127
Turbo	*Max NLOADIF4C*	127
Auto	*Max NLOADIF5C*	127

11.1.3 Target Frequency Setting

The compressor target frequency is a function of the NLOAD number sent from the indoor controller and the outdoor air temperature.

Basic Target Frequency Setting:

NLOAD	Target Frequency
127	*Maximum frequency*
10 < NLOAD < 127	Interpolated value between minimum and maximum frequency
10	*Minimum frequency*
0	Compressor is stopped

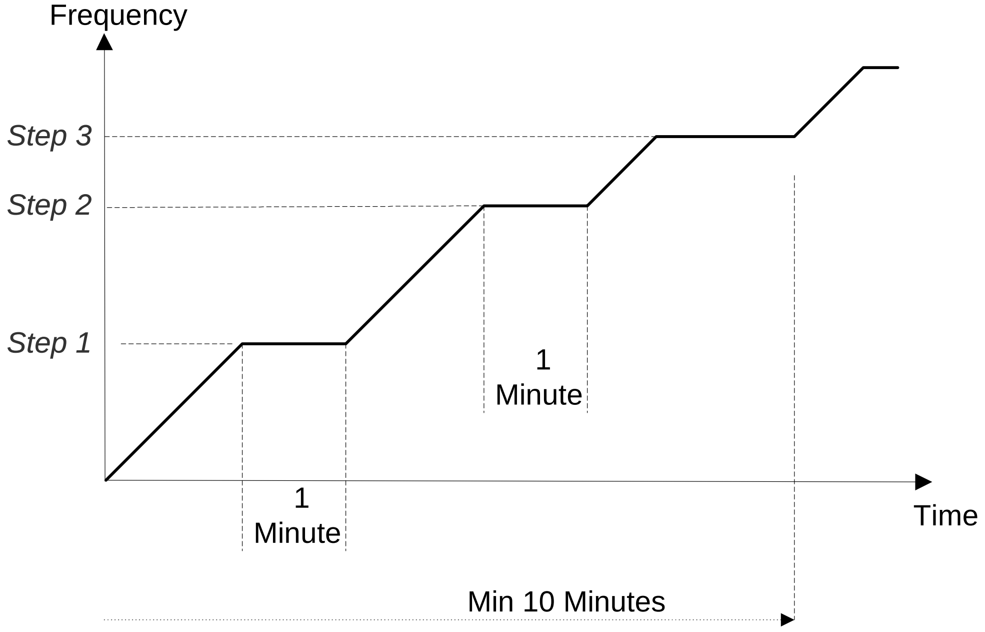
Target frequency limits as a function of outdoor air temperature (OAT):

OAT Range	Cool mode limits	Heat mode limits
OAT < 6	*MaxFreqAsOATC*	No limit
6 ≤ OAT < 15		*MaxFreqAsOAT1H*
15 ≤ OAT < 28		*MaxFreqAsOAT2H*
28 ≤ OAT	No limit	

11.1.4 Frequency Changes Control

Frequency change rate is 1 Hz/sec.

11.1.5 Compressor Starting Control



11.1.6 Minimum On and Off Time

3 minutes.

11.1.7 Indoor Fan Control

10 Indoor fan speeds are determined for each model. 5 speeds for cool/dry/fan modes and 5 speeds for heat mode.
When user sets the indoor fan speed to a fixed speed (Low/ Medium/ High), unit will operate constantly at set speed.
When Auto Fan is selected, indoor unit controller can operate in all speeds. The actual speed is set according to the cool/heat load.

11.1.8 Turbo Speed

The Turbo speed is activated during the first 30 minutes of unit operation when auto fan speed is selected and under the following conditions:

- Difference between set point and actual room temperature is bigger then 3 degrees.
- Room temperature > 22 for cooling, or < 25 for heating.

11.1.9 Heating Element Control

Heating element can be started if LOAD > 0.8 * MaximumNLOAD AND Indoor Coil temperature < 45.
The heating element will be stopped when LOAD < 0.5 * MaximumNLOAD OR if Indoor Coil temperature > 50.

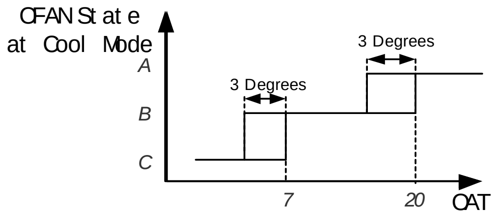
11.1.10 Outdoor Fan Control

- The OFAN motor is an AC type that operates with 2 speeds (Low/High), controlled by Relays.
- OFAN speed depends on the compressor Target Frequency, and it's set according to the following table and graphs.
- OFAN can change its Speed only if it has been working in the current speed for at least 35 seconds:

Compressor Target Frequency	OFAN Speed			
	Normal cases State A at cool / Heat	State B at cool	State C at cool	OAT>15 °C at heat
Freq=0	OFF	OFF	OFF	OFF
10 ≤ Freq < OFLowFreq	Low	Low	Low	Low
OFLowFreq ≤ Freq< OFMedFreq	High	Low	Low	Low
OFMedFreq≤ Freq	High	Low	Low	High

Notes:

When OAT is faulty or disabled OFAN will follow 'Normal cases' rules (left column).



Note: Periorities A>B>C

1. OFLowFreq = *OFLowFreqC* in cool mode, and *OFLowFreqH* in heat mode.
2. OFMedFreq = *OFMedFreqC* in cool mode, and *OFMedFreqH* in heat mode.

The OFAN will be off when the compressor is off.

- An exception for the following rule is when compressor was operating in cool mode before stopped. In this case OFAN will remain on in low speed for 1 minute.
- Whenever the indoor unit is under indoor coil overheating protection, as long as the protection status is HzD2, the outdoor fan will change to off. It will be enabled to be back on when the status of this protection becomes normal.
- Upon receiving night mode signal (ON), through communication, the OFAN will be operating in LOW speed only in Cool. It will be back to its normal operation when receiving OFF signal.

11.1.12 EEV (electronic Expansion valve) Control

EEV opening is defined as $EEV = EEV_{OL} + EEV_{CV}$

EEV_{OL} is the initial EEV opening as a function of the compressor frequency, operation mode, unit model and capacity.

EEV_{CV} is a correction value for the EEV opening that is based on the compressor temperature.

During the first 5 minutes of compressor operation $EEV_{CV} = 0$.
Once the first 5 minutes are over, the correction value is calculated as follow: $EEV_{CV}(n) = EEV_{CV}(n-1) + EEV_{CTT}$

EEV_{CTT} is the correction based on the compressor temperature. A target compressor temperature is set depending on frequency and outdoor air temperature, and the actual compressor temperature is compared to the target temperature to set the required correction to the EEV opening.

11.1.13 Reversing Valve (RV) Control

Reversing valve is on in heat mode.
Switching of RV state is done only after compressor is off for over 3 minutes.

11.2 Fan Mode

In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.
In AutoFan user setting, fan speed will be adjusted automatically according to the difference between actual room temperature and user set point temperature.

11.3 Cool Mode

NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.
In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.
In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

11.4 Heat Mode

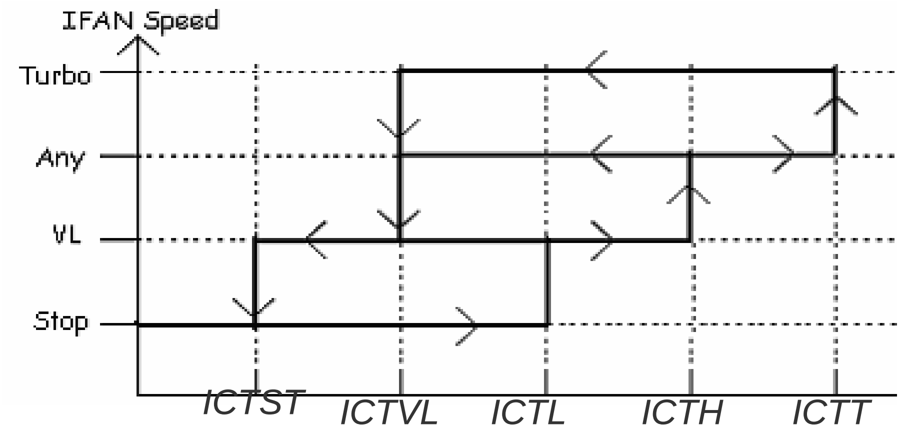
NLOAD is calculated according to the difference between actual room temperature and user set point temperature by PI control.
In high/ medium/ low indoor fan user setting, unit will operate fan in selected speed.
In AutoFan user setting, fan speed will be adjusted automatically according to the calculated NLOAD.

11.4.1 Temperature Compensation

4 degrees are reduced from RT sensor temperature reading (excluding I-Feel mode), to compensate for temperature difference between high and low areas in the heated room, and due to coil heat radiation on RT sensor.

11.4.2 Indoor Fan Control in Heat Mode

Indoor fan speed depends on the indoor coil temperature:



11.5 Auto Cool/Heat Mode

When in auto cool heat mode unit will automatically select between cool and heat mode according to the difference between actual room temperature and user set point temperature (ΔT).
Unit will switch from cool to heat when compressor is off for 3 minutes, and ΔT < -3.
Unit will switch from heat to cool when compressor is off for 5 minutes, and ΔT < -3.

11.6 Dry Mode

As long as room temperature is higher then the set point, indoor fan will work in low speed and compressor will work between 0 and *MaxNLOADIF1C* Hz.
When the room temperature is lower than the set point, compressor will be switched OFF and indoor fan will cycle 3 minutes OFF, 1 minute ON.

11.7 Protections

There are 5 protection codes.
Normal (Norm) – unit operate normally.
Stop Rise (SR) – compressor frequency can not be raised but does not have to be decreased.
HzDown1 (D1) – Compressor frequency is reduced by 2 to 5 Hz per minute.
HzDown2 (D2) – Compressor frequency is reduced by 5 to 10 Hz per minute.
Stop Compressor (SC) – Compressor is stopped.

11.7.1 Indoor Coil Defrost Protection

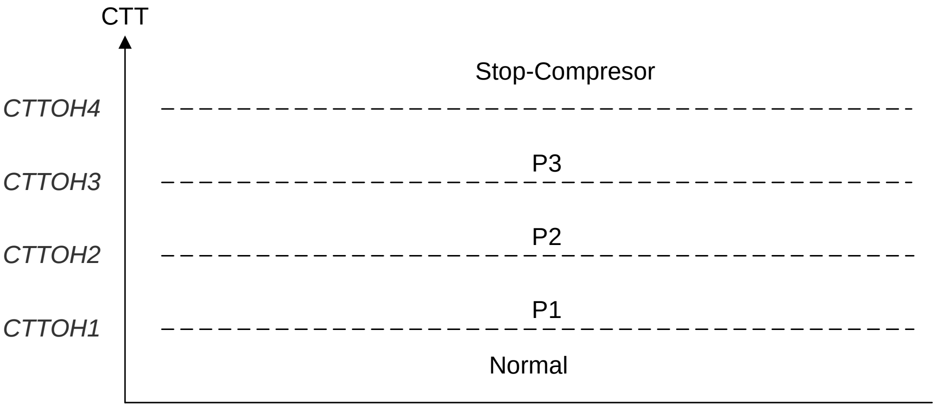
ICT	ICT Trend				
	Fast Increasing	Increasing	No change	Decreasing	Fast Decreasing
ICT < -2	SC	SC	SC	SC	SC
-2 ≤ ICT < 0	D1	D1	D2	D2	D2
0 ≤ ICT < 2	SR	SR	D1	D2	D2
2 ≤ ICT < 4	SR	SR	SR	D1	D2
4 ≤ ICT < 6	Norm	Norm	SR	SR	D1
6 ≤ ICT < 8	Norm	Norm	Norm	SR	SR
8 ≤ ICT	Normal				

11.7.2 Indoor Coil over Heating Protection

ICT	ICT Trend				
	Fast Decreasing	Decreasing	No Change	Increasing	Fast Increasing
ICT > 55	SC	SC	SC	SC	SC
53 < ICT ≤ 55	D1	D1	D2	D2	D2
49 < ICT ≤ 53	SR	SR	D1	D2	D2
47 < ICT ≤ 49	SR	SR	SR	D1	D2
45 < ICT ≤ 47	Norm	Norm	SR	SR	D1
43 < ICT ≤ 45	Norm	Norm	Norm	SR	SR
ICT ≤ 43	Normal				

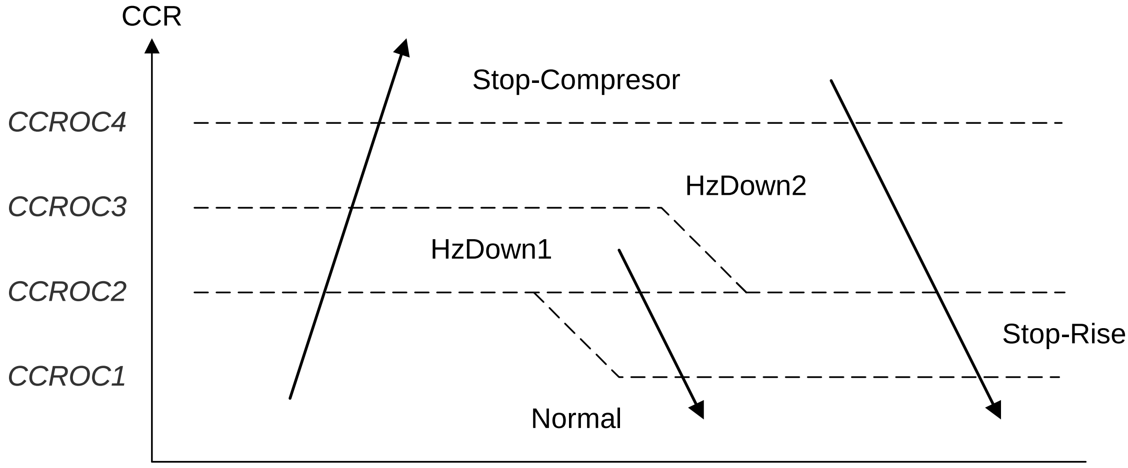
11.7.3 Compressor over Heating Protection

Compressor temperature can be in one of 5 control zones (4 in protection, and 1 normal), according to the following chart.



Control Status	Compressor Temperature Increases	Else
P1	Norm	SR
P2	D1	SR
P3	D2	D1
Stop Compressor	SC	

11.7.4 Compressor over Current Protection



11.7.5 Heat Sink Over Heating Protection (NA for DCI 25 and 35)

HST	HST Trend		
	Decreasing	No Change	Increasing
HST > 90	SC	SC	SC
85 < HST ≤ 90	D1	D2	D2
82 < HST ≤ 85	SR	D1	D2
80 < HST ≤ 82	SR	SR	D1
78 < HST ≤ 80	Norm	Norm	SR
HST ≤ 78	Normal		

11.7.6 Outdoor Coil Deicing Protection

Deicing Starting Conditions

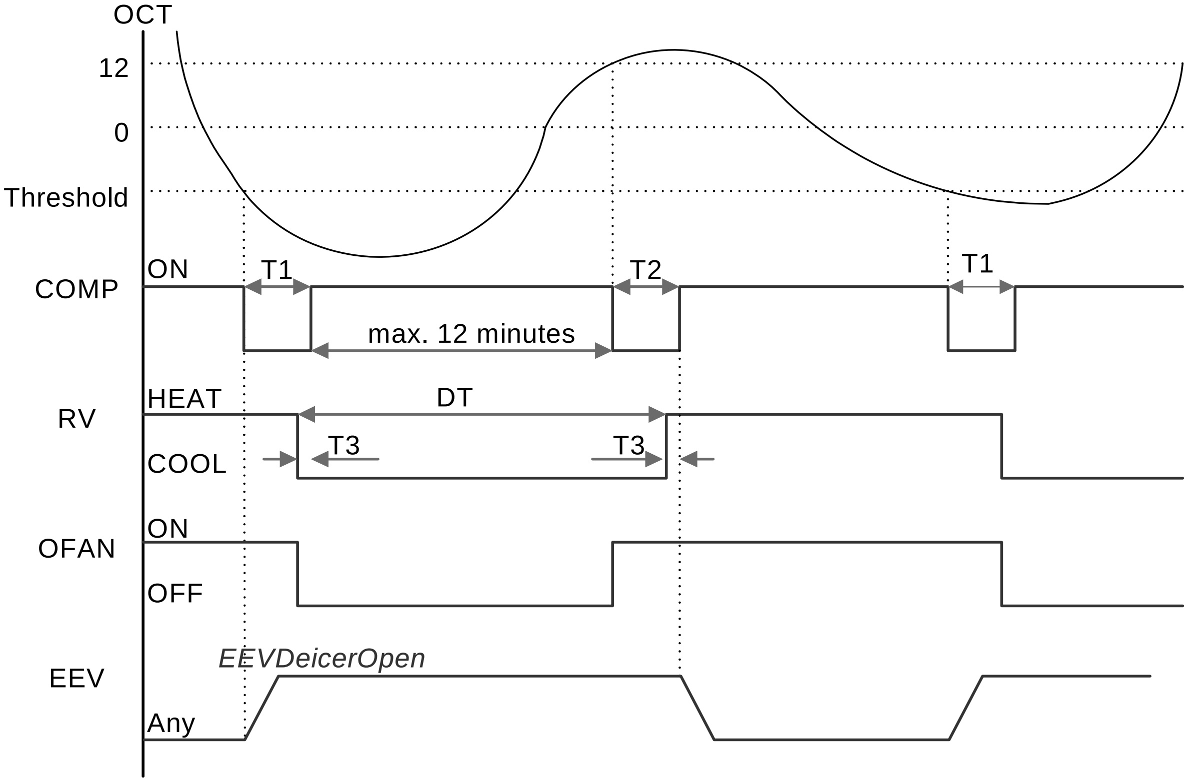
Deicing operation will start when either one of the following conditions exist:

- Case 1: OCT < OAT – 8 AND TLD > DI
- Case 2: OCT < OAT – 12 AND TLD > 30 minutes.
- Case 3: OCT is Invalid AND TLD > DI
- Case 4: Unit is just switched to STBY AND OCT < OAT – 8
- Case 5: NLOAD = 0 AND OCT < OAT -8

OCT – Outdoor Coil Temperature
OAT – Outdoor Air Temperature
TLD – Time from Last Deicing
DI – Deicing Interval (Time Interval Between Two Deicing)

Deicing interval time when compressor is first started in heat mode, is 10 minutes if OCT < -2, and is 40 minutes in other cases.
Deicing interval time is changed (increased/ decreased in 10 minutes steps) as a function of deicing time. If deicing time is shorter then former deicing time, the deicing interval time will be increased. If deicing time is longer then former deicing time, the deicing interval time will be decreased.

Deicing Protection Procedure



T1 =60 seconds, T2 = 36 seconds, T3 = 6 seconds

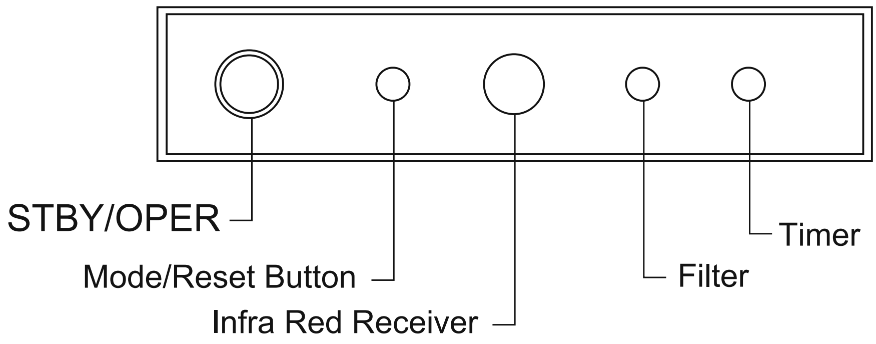
11.8 Operating the Unit from the Mode Button

Forced operation allows to start, stop and operate in Cooling or Heating, in pre-set temperature according to the following table:

Forced operation Mode	Pre-set Temperature
Cooling	$20^{0}C$
Heating	$28^{0}C$

11.9 On Unit Controls and Indicators

The following is schematic drawing for the display:



STAND BY INDICATOR	1. Lights up when the Air Conditioner is connected to power and the mode is STBY. 2. Blinks for 3 seconds, when the system is switched to Heat Mode by using the Mode/Reset Switch on the unit (the operation indicator will be off during this blinking time).
OPERATION INDICATOR	1. Lights up during operation mode (except for item in STBY indicator). 2. Blinks for 300 msec., to announce that a R/C infrared signal has been received and stored. 3. Blinks continuously during protections (according to the relevant spec section). 4. Blinks for 3 seconds when the system is switched to Cool Mode by using the Mode/Reset Switch on the unit.
TIMER INDICATOR	Lights up during Timer and Sleep operation.
FILTER INDICATOR	Lights up when Air Filter needs to be cleaned.
MODE / RESET BUTTON	As long as the filter Led is off, the Mode/Reset button functions as Mode switch. Once filter Led is on, the Mode/Reset button functions as Reset switch. Mode Function: Every short pressing , the next operation mode is selected, in this order: SB → Cool Mode → Heat Mode → SB → … In long pressing system enters diagnostic mode (refer to diagnostic mode Sect.) Reset Function: For short pressing: When Filter LED is on, it turns off the filter indicator.

Notes

1. Pressing time is defined as the time between press and release.
2. If pressing time is one second or less – press is considered as short pressing.
3. If pressing time is three seconds or longer – pressing is considered as long pressing. In between, pressing is undetermined and system will not respond to pressing.
4. For the LED functionality during diagnostics, refer to the diagnostics Sect.

11.10 Outdoor Unit Controller Indicators

Unit has three LED's. SB LED, STATUS LED, FAULT LED.
SB LED is ON when power is ON (230 VAC),
STATUS LED is ON when COMP is ON, and Blinks according to diagnostics mode definitions when either fault or protection occurs.
FAULT LED Blinks according to diagnostics mode definitions when either fault or protection occurs.

11.11 Test Mode

11.11.1 Entering Test Mode

System can enter Test mode in two ways:

- Automatically when the following conditions exists for 30 minutes continuously:
  - Mode = Cool, Set point = 16, Room temperature = 27±1, Outdoor temperature = 35±1

  Or
  - Mode = Heat, Set point = 30, Room temperature = 20±1, Outdoor temperature = 7±1
- Manually when entering diagnostics with the following settings:
-
  - Mode = Cool, Set point = 16
  - Mode = Heat, Set point = 30

11.11.2 Unit Operation in Test Mode

In test mode, the unit will operate in fixed settings according to the indoor fan speed setting:

Indoor Fan Speed Setting	Unit Setting
Low	Minimum Capacity Setting
High	Nominal Capacity Setting
Auto	Maximum Capacity Setting

During test mode, protections are disabled, except for stop compressor status.

11.12 SW Parameters

11.12.1 Indoor Units SW Parameters

General Parameters for All Models:

Parameters defining the indoor fan speed as a function of Indoor Coil temperature in heat mode (ICT):

ICTST Speed	ICT to stop indoor fan	25
ICTVLSpeed	ICT to go down to very low speed	28
ICTLSpeed	ICT to start in very low speed	30
ICTHSpeed	ICT to start in increase speed from very low	32
ICTTSpeed	ICT to enable Turbo fan speed	40

Parameters for defrost protection:

ICTDef1	ICT to go back to normal	8
ICTDef2	ICT to ‘stop rise’ when ICT decrease	6
ICTDef3	ICT to ‘stop rise’ when ICT is stable	4
ICTDef4	ICT to ‘Hz Down’ when ICT decrease	2
ICTDef5	ICT to ‘Hz Down’ when ICT is stable	0
ICTDef6	ICT to stop compressor	-2

Parameters for indoor coil over heating protection:

ICTOH1	ICT to go back to normal	45
ICTOH2	ICT to ‘stop rise’ when ICT increase	48
ICTOH3	ICT to ‘stop rise’ when ICT is stable	52
ICTOH4	ICT to ‘Hz Down’ when ICT increase	55
ICTOH5	ICT to ‘Hz Down’ when ICT is stable	60
ICTOH6	ICT to stop compressor	62

Model Depended Parameters:

Parameter name	Models		
	22	25	35
NLOAD limits as a function of selected indoor fan speed			
MaxNLOADIF1C	40	40	40
MaxNLOADIF2C	55	51	55
MaxNLOADIF3C	120	90	90
MaxNLOADIF4C	127	127	127
MaxNLOADIF5C	127	127	127
Indoor Fan speeds			
IFVLOWC	700	700	700
IFLOWC	800	850	850
IFMEDC	950	1050	1000
IFHIGHC	1050	1200	1200
IFTURBOC	1150	1250	1250
IFVLOWH	700	700	700
IFLOWH	850	950	950
IFMEDH	1000	1050	1100
IFHIGHH	1100	1250	1250
IFTURBOH	1200	1350	1300
Nominal Compressor Frequency			
NomLoadC	40	51	61
NomLoadH	55	58	62

11.12.2 Outdoor Units SW Parameters

Parameter Name	DCI25	DCI35	DCI 50
Compressor Parameters			
MinFreqC	30	35	35
MaxFreqC	52	62	70
MinFreqH	30	35	40
MaxFreqH	60	73	66
Step1Freq		45	45
Step2Freq		55	55
Step3Freq		65	65
Frequency limits as a function of outdoor air temperature			
MaxFreqAsOATC		50	60
MaxFreqAsOAT1H		58	60
MaxFreqAsOAT2H		50	50
Compressor Over Heating Protection			
CTTOH1	94	94	94
CTTOH2	98	98	98
CTTOH3	102	102	102
CTTOH4	105	105	105
CTTOH5	120	120	120
Compressor Over Current Protection [A]			
CCR01	40	40	40
CCR02	42	42	42
CCR03	44	44	44
CCR04	47	47	47
Outdoor Fan Speed (RPM)			
OFLOWC	610	600	600
OFMEDC	700	760	760

11.12.3 Outdoor Units SW Parameters

Parameter Name	DCR22	DCR25	DCR 35	DCR50
Compressor Parameters				
MinFreqC	35	35	35	20
MaxFreqC	52	62	70	77
MinFreqH	38	35	40	26
MaxFreqH	67	73	66	79
Step1Freq	40	43	45	60
Step2Freq	50	55	55	70
Step3Freq	63	63	65	80
Frequency limits as a function of outdoor air temperature				
MaxFreqAsOATC	44	50	60	64
MaxFreqAsOAT1H	53	58	60	75
MaxFreqAsOAT2H	45	50	50	60
Compressor Over Heating Protection				
CTTOH1	94	94	94	94
CTTOH2	98	98	98	98
CTTOH3	102	102	102	102
CTTOH4	105	105	105	105
CTTOH5	120	120	120	120
Compressor Over Current Protection [A]				
CCR01	28	35	40	100
CCR02	30	37	42	105
CCR03	32	39	44	108
CCR04	35	42	47	102
Outdoor Fan Speed (RPM)				
OFLOWC	610	600	600	600
OFMEDC				760
OFMAXC	700	760	760	920

12. TROUBLESHOOTING

WARNING!!!
When Power Up – the whole outdoor unit controller, including the wiring, is under HIGH VOLTAGE!!!
Never open the Outdoor unit before turning off the Power!!!
When turned off, the system is still charged (400V)!!!
It takes about 4 Min. to discharge the system.
Touching the controller before discharging may cause an electrical shock!!!

12.1 Single Split system failures and corrective actions

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
1	Power supply indicator (Red LED) does not light up.	No power supply	Check power supply. If power supply is OK, check display and display wiring. if OK, replace controller.
2	Unit does not respond to remote control message	Remote control message not reached the indoor unit	Check remote control batteries, if batteries are OK, check display and display wiring, if OK, replace display PCB. If still not OK replace controller.
3	Unit responds to remote control message but Operate indicator (Green LED) does not light up	Problem with display PCB	Replace display PCB. If still not OK replace controller.
4	Indoor fan does not start (louvers are opened and Green LED does light up)	Unit in heat mode and coil is still not warm.	Change to cool mode and check.
		Problem with PCB or capacitor	Change to high speed and Check power supply to motor is higher than 130VAC (for triack controlled motor) or higher than 220VAC for fixed speed motors, if OK replace capacitor, if not replace controller
5	Indoor fan works when unit is OFF, and indoor fan speed is not changed by remote control command.	PCB problem	Replace controller
6	Compressor does not start	Electronics control problem or protection	Perform diagnostics , and follow the actions described.
7	Compressor stops during operation and Green LED remains on	Electronic control or power supply problem	Perform diagnostics ,and follow the actions described.
8	Compressor is on but outdoor fan does not work	Problem with outdoor electronics or outdoor fan	Check outdoor fan motor according to the procedure in section, if not OK replace controller

No	SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
9	Unit works in wrong mode (cool instead of heat or heat instead of cool)	Electronics or power connection to RV	Check RV power connections, if OK, Check RV operation with direct 230VAC power supply, if OK, Replace outdoor controller.
10	All components are operating properly but no cooling or no heating	Refrigerant leak	Check refrigeration system.
11	Compressor is over heated and unit does not generate capacity	EEV problem	Check EEV
12	Units goes into protections and compressor is stopped with no clear reason	Control problem or refrigeration system problem	Perform diagnostics and follow the actions described.
13	Compressor motor is generating noise and no suction occurs	Phase order to compressor is wrong	Check compressor phase order.
14	Water leakage from indoor unit	Indoor unit drainage tube is blocked	Check and open drainage tube.
15	Freezing of outdoor unit in heat mode and outdoor unit base is blocked with ice		Connect base heater.
16	Unit operates with wrong fan speeds or wrong frequency	Wrong jumper settings	Perform diagnostics, and check if units is operating by EEPROM parameters.

12.2 Checking the refrigeration system

Checking system pressures and other thermodynamic measures should be done when system is in Test Mode (in Test mode, system operates in fixed settings). The performance curves given in this manual are given for unit performance in test mode when high indoor fan speed is selected.

Entering test mode:
Set unit to Cool/16 degrees/High indoor fan speed, or Heat/30 degrees/High indoor fan speed, and enter diagnostics.

12.3 Judgment by Indoor/Outdoor Unit Diagnostics

Enter diagnostics mode - press for five seconds Mode/Reset button in any operation mode. Acknowledgment is by 3 short beeps and lights of all Display LED's. Then, The units will enter into Indoor and Outdoor unit diagnostic modes.

During the Outdoor unit diagnostics all three Indoor LED's (STBY/Operate, Filter and Timer) are blinking. When Indoor diagnostics is displayed, all three LED's (STBY/Operate, Filter and Timer) are ON.

When system enters diagnostics mode, only one fault code is shown. Order of priority is from the lower to the higher number. Diagnostics is continuously ON as long as power is ON. The current system operation mode will not be changed.

If no fault occurred in the system, no fault code will be displayed during normal operation mode. The last fault code will be displayed even if the system has recovered from that fault. The last fault will be deleted from the EEPROM after the system has exit diagnostics mode.

In diagnostics mode, system fault / status will be indicated by blinking of Filter & Timer LEDs.

The coding method will be as follows:

Filter LED will blink 5 times in 5 seconds, and then will be shut off for the next 5 seconds. Timer LED will blink during the same 5 seconds according to the following Indoor / Outdoor unit tables:

Note: 0 – OFF,   1-ON

12.3.1 Indoor unit Diagnostics

No	Problem	5	4	3	2	1
1	RT-1 is disconnected	0	0	0	0	1
2	RT-1 is shorted	0	0	0	1	0
3	RT-2 is disconnected	0	0	0	1	1
4	RT-2 is shorted	0	0	1	0	0
5	Reserved	0	0	1	0	1
7	Communication mismatch	0	0	1	1	1
8	No Communication	0	1	0	0	0
9	No Encoder	0	1	0	0	1
10	Reserved	0	1	0	1	0
11	Outdoor Unit Fault	0	1	0	1	1
…	Reserved					
17	Defrost protection	1	0	0	0	1
18	Deicing Protection	1	0	0	1	0
19	Outdoor Unit Protection	1	0	0	1	1
20	Indoor Coil HP Protection	1	0	1	0	0
21	Reserved	1	0	1	0	1
22	Reserved					
24	EEPROM Not Updated	1	1	0	0	0
25	Bad EEPROM	1	1	0	0	1
26	Bad Communication	1	1	0	1	0
27	Using EEPROM data	1	1	0	1	1
28	Model A	1	1	1	0	0
29	Model B	1	1	1	0	1
30	Model C	1	1	1	1	0
31	Model D	1	1	1	1	1

12.3.2 Indoor unit diagnosis and corrective actions

No.	Fault	Probable Cause	Corrective Action
1	Sensor failures of all types		Check sensor connections or replace sensor
2	Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
3	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
4	No Encoder	Indoor electronics or motor	Check motor wiring, if ok, replace motor, if still not ok, replace Indoor controller.
5	Outdoor Unit Fault	Outdoor controller problem	Switch to Outdoor diagnostics.
6	EEPROM Not Updated	System is using ROM parameters and not EEPROM parameters	No action, unless special parameters are required for unit operation.
7	Bad EEPROM		No action, unless special parameters are required for unit operation.
8	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding
9	Using EEPROM data	No problem. System is using EEPRRRROM parameters	

12.3.3 Outdoor unit Diagnostics :

DCR 22/25/35 Diagnostics

No	Problem	5	4	3	2	1
1	OCT is disconnected	0	0	0	0	1
2	OCT is shorted	0	0	0	1	0
3	CTT is disconnected	0	0	0	1	1
4	CTT is shorted	0	0	1	0	0
5	reserved					
6	reserved					
7	OAT is disconnected (when enabled)	0	0	1	1	1
8	OAT is shorted (when enabled)	0	1	0	0	0
9	reserved					
10	reserved					
11	IPM Fault	0	1	0	1	1
12	reserved					
13	DC under voltage	0	1	1	0	1
14	DC over voltage	0	1	1	1	0
15	AC under voltage	0	1	1	1	1
16	Indoor / Outdoor unit Communication mismatch	1	0	0	0	0
17	No Communication	1	0	0	0	1
18	Reserved					
19	Reserved					
20	Reserved					
21	Deicing	1	0	1	0	1
22	Compressor Over Heating	1	0	1	1	0
23	Compressor Over Current	1	0	1	1	1
24	Reserved					
25	Reserved					
26	Copressor Lock	1	1	0	1	0
27	Bad Communication	1	1	0	1	1
20	Heat sink Over Heating	1	0	1	0	0
21	Deicing	1	0	1	0	1
22	Compressor Over Heating	1	0	1	1	0
26	Copressor Lock	1	1	0	1	0
27	Bad Communication	1	1	0	1	1

DCR50 diagnostics:

No	Problem	5	4	3	2	1
1	OCT is disconnected	0	0	0	0	1
2	OCT is shorted	0	0	0	1	0
3	CTT is disconnected	0	0	0	1	1
4	CTT is shorted	0	0	1	0	0
5	HST is disconnected (when enabled)	0	0	1	0	1
6	HST is shorted (when enabled)	0	0	1	1	0
7	OAT is disconnected (when enabled)	0	0	1	1	1
8	OAT is shorted (when enabled)	0	1	0	0	0
9	TSUC is disconnected (when enabled)	0	1	0	0	1
10	TSUC is shorted (when enabled)	0	1	0	1	0
11	IPM Fault	0	1	0	1	1
12	Bad EEPROM	0	1	1	0	0
13	DC under voltage	0	1	1	0	1
14	DC over voltage	0	1	1	1	0
15	AC under voltage	0	1	1	1	1
16	Indoor / Outdoor unit Communication mismatch	1	0	0	0	0
17	No Communication	1	0	0	0	1
18	Reserved	1	0	0	1	0
20	Heat sink Over Heating	1	0	1	0	0
21	Deicing	1	0	1	0	1
22	Compressor Over Heating	1	0	1	1	0
23	Compressor Over Current	1	0	1	1	1
24	No OFAN Feedback	1	1	0	0	0
25	OFAN Locked	1	1	0	0	1
26	Compressor Lock	1	1	0	1	0
27	Bad Communication	1	1	0	1	1

12.3.4 Outdoor unit diagnosis and corrective actions

NO	Fault	Probable Cause	Corrective Action
1	Sensors failures of all types		Check sensors connections or replace sensors.
2	IPM Fault	Electronics HW problem	Check all wiring and jumper settings, if OK, replace electronics.
3	Bad EEPROM		No action, unless special parameters are required for unit operation.
4	DC under/over Voltage	Electronics HW problem	Check outdoor unit power supply voltage
5	AC under Voltage		Check outdoor unit power supply voltage
6	Indoor / Outdoor unit Communication mismatch	Indoor and Outdoor controllers are with different versions	Replace Indoor controller
7	No Communication	Communication or grounding wiring is not good.	Check Indoor to Outdoor wiring and grounding
8	Compressor Lock		Switch unit to STBY and restart
9	Bad Communication	Communication quality is low reliability	Check Indoor to Outdoor wiring and grounding

12.4 Judgment by MegaTool

MegaTool is a special tool to monitor the system states.
Using MegaTool requires:

- A computer with RS232C port.
- A connection wire for MegaTool.
- A special MegaTool software.

Use MegaTool according to following procedure:

- Setup MegaTool software: copy the software to the computer.
- Connect RS232C port in computer with MegaTool port in Indoor/Outdoor unit controller by the connection wire.
- Run the software and choose the COM port, you can monitor the A/C system state in monitor tab.

12.5 Simple procedures for checking the Main Parts

12.5.1 Checking Mains Voltage.

Confirm that the Mains voltage is between 198 and 264 VAC. If Mains voltage is out of this range, abnormal operation of the system is expected. If in range check the Power (Circuit) Breaker and look for broken or loosed cable lugs or wiring mistake(s).

12.5.2 Checking Power Input.

If Indoor unit power LED is unlighted, power down the system and check the fuse of the Indoor unit. If the fuse is OK replace the Indoor unit controller. If the fuse has blown, replace the fuse and power up again. Checking Power Input procedure for the Outdoor unit is the same as with the Indoor unit.

12.5.3 Checking the Outdoor Fan Motor.

Enter Test Mode (where the OFAN speed is high)
Check the voltage between lead wires according to the normal value as following:

- Between red wire and black wire: 310VDC +/- 20V
- Between orange wire and black wire: 15VDC +/- 1V
- Between yellow wire and black wire: 2-6VDC

12.5.4 Checking the Compressor.

The compressor is brushless permanence magnetic DC motor. Three coil resistance is same. Check the resistance between three poles. The normal value should be below 0.5 ohm (TBD).

12.5.5 Checking the Reverse Valve (RV).

Running in heating mode, check the voltage between two pins of reverse valve connector, normal voltage is 220VAC.

12.5.6 Checking the electrical expansion valve (EEV).

The EEV has two parts, drive part and valve. The drive part is a step motor; it is ringed on the valve. Check the drive voltage (12VDC). When Outdoor unit is power on, EEV shall run and have click and vibration.

12.6 Precaution, Advise and Notice Items

12.6.1 High voltage in Outdoor unit controller.

Whole controller, including the wires that are connected to the Outdoor unit controller may have the potential hazard voltage when power is on. Touching the Outdoor unit controller may cause an electrical shock.
Advise: Don’t touch the naked lead wire and don’t insert finger, conductor or anything else into the controller when power is on.

12.6.2 Charged Capacitors

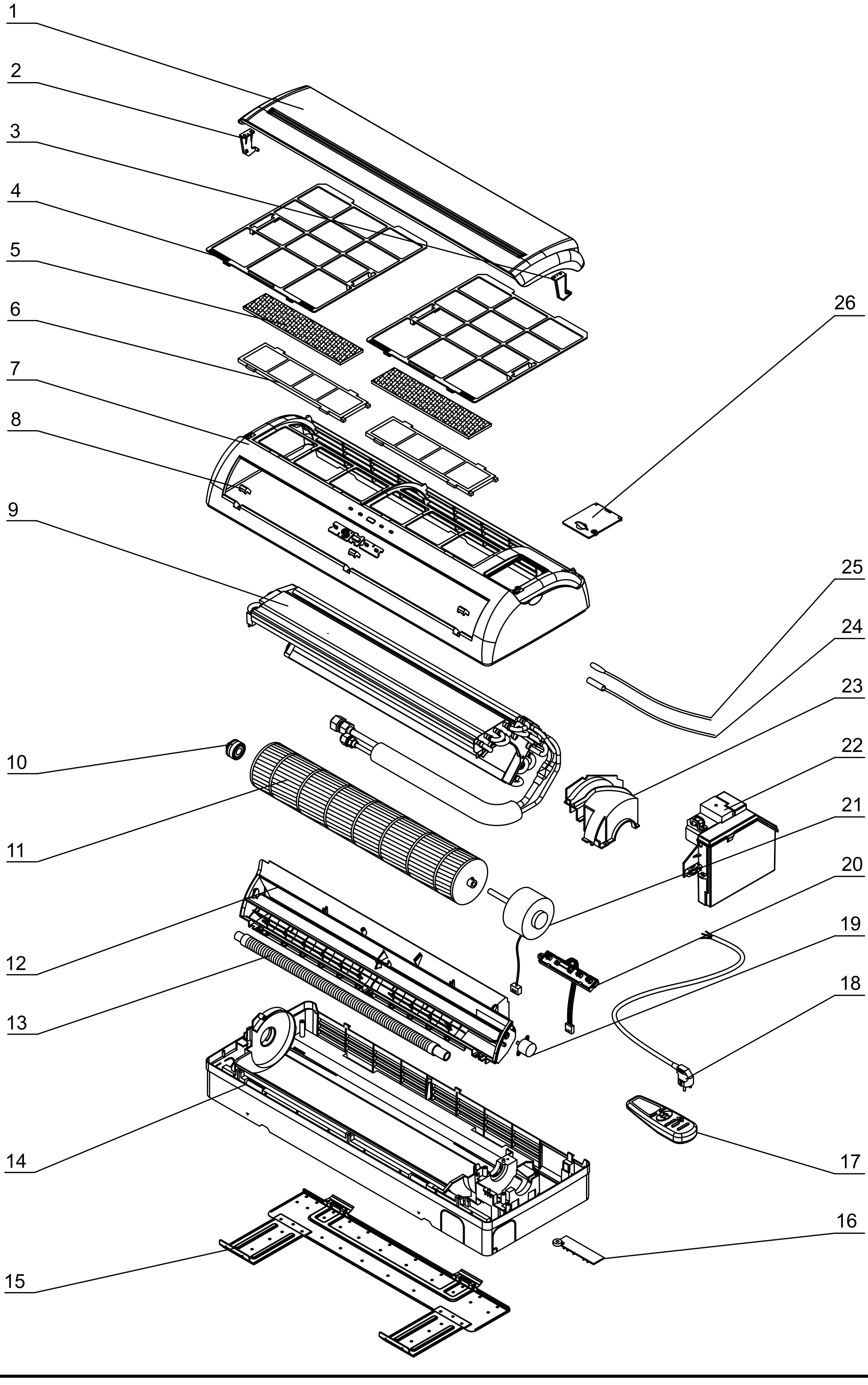
Three large-capacity electrolytic capacitors are used in the Outdoor unit controller. Therefore, charging voltage (380VDC) remains after power down. Discharging takes about four minutes after power is off. Touching the Outdoor unit controller before discharging may cause an electrical shock.

12.6.3 Additional advises

- When disassemble the controller or the front panel, turn off the power supply.
- When connecting or disconnecting the connectors on the PCB, hold the whole housing, don’t pull the wire.

13. EXPLODED VIEWS AND SPARE PARTS LISTS

13.1 Indoor Unit: Delta 25, Delta 35 DCI



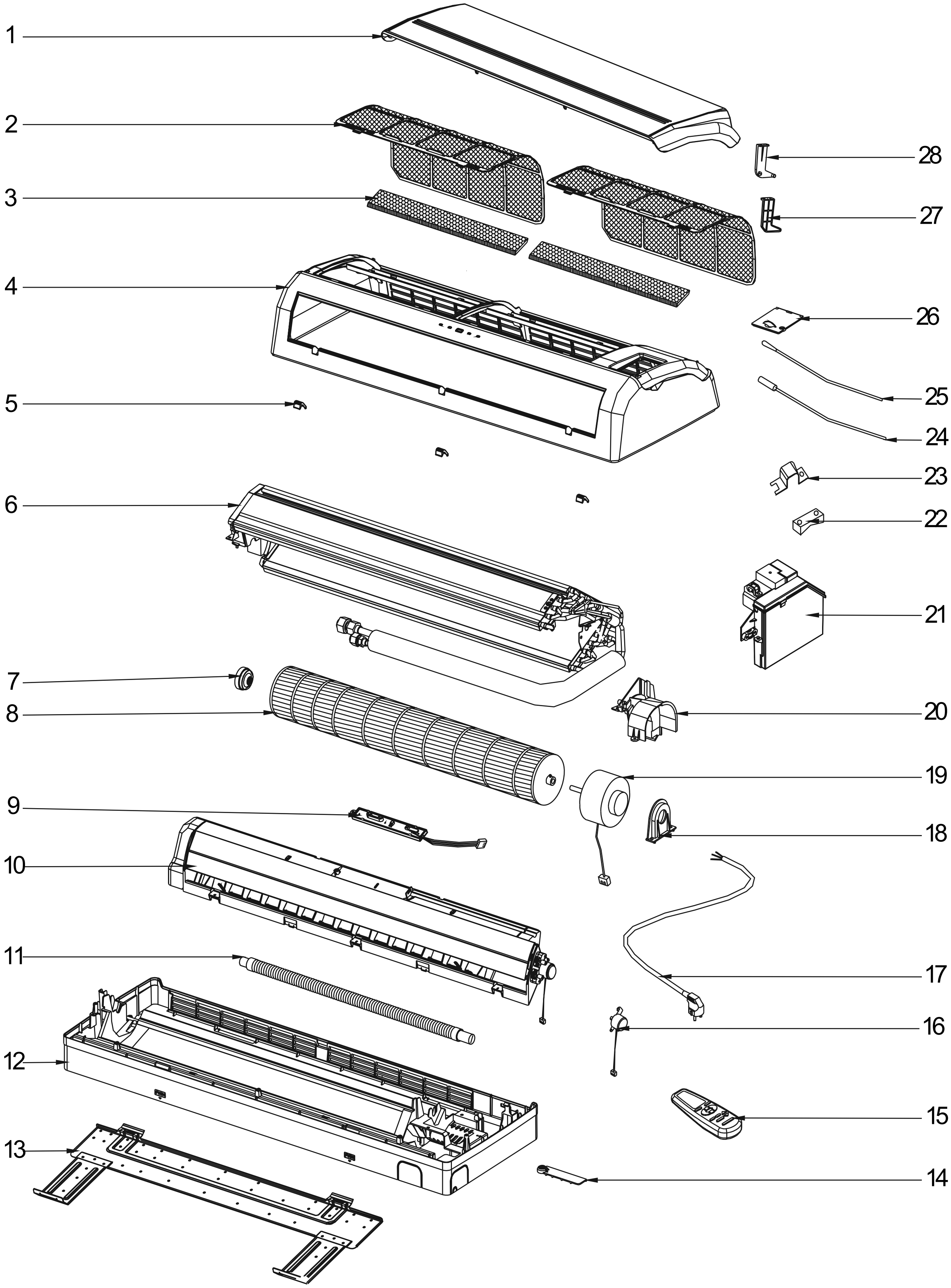
13.2 Indoor Unit: Delta 25 DCI

No.	Item	Description	Quantity
1	453037000	Grill A / DELTA 9	1
2	453100500	Grill L axis	1
3	453100600	Grill R axis	1
4	453036500	Filter for DELTA 7/9	2
7	453122200	Silk-screen front frame	1
8	4525987	SCREW COVER	3
9	453070701	Evap. System Assy./DELTA 20,2	1
10	4523526	BERAING ASSY FAN	1
11	453264200	Impeller Fan	1
12	452784400	IOD-7,9 Air outlet Assy. (no	1
13	465210017	Drain Pipe Delta7/9	1
14	4526659	REAR PANEL ASSY	1
15	464220008	Mount Bracket./Low Cost ALPHA 9	1
16	4526000	TUBE CLIP	1
18	455013301R	EUR EURPowerCord/3G/1.0/2100(187)	1
19	4523507	Step motor	1
20	453089600R	Display assy. for DELTA EHK:936A034-00	1
21	453088600R	PG Resin motor 12W	1
22	467300141R	DC Inverter indoor controller (Mask)/DEL	1
23	4525998	MOTEOR COVER	1
24	438082	Thermistor Indoor	1
25	467400024	(320mm) Indoor Air Inlet Temperature Se	1
26	453027000	Terminal Cover	1
29	467240008	Remote controller Assy.with batteries. R	1

13.3 Indoor Unit: Delta 35 DCI

No.	Item	Description	Quantity
1	453036800	Grill A / DELTA 12	1
2	453100500	Grill L axis	1
3	453100600	Grill R axis	1
4	453082900	Filter for DELTA 12	2
7	453122000	Front Frame Assy for AIRWELL	1
8	4525987	SCREW COVER	3
9	453058201	Evap. System Assy./DELTA 35	1
10	4523526	BERAING ASSY FAN	1
11	4527111	FAN ASSY PLASTIC	1
12	452784401	IOD-12 Air Outlet Assy. (no wire)	1
13	465210017	Drain Pipe Delta7/9	1
14	4527186	IOD-12 REAR PANEL ASSY	1
15	464220007	Mount Bracket./Low Cost ALPHA 12	1
16	4526000	TUBE CLIP	1
18	455013301R	EUR EURPowerCord/3G/1.0/2100(187)	1
19	4523507	Step motor	1
20	453089600R	Display assy. for DELTA EHK:936A034-00	1
21	453088600R	PG Resin motor 12W	1
22	467300141R	DC Inverter indoor controller (Mask)/DEL	1
23	4525998	MOTEOR COVER	1
24	438082	Thermistor Indoor	1
25	467400024	(320mm) Indoor Air Inlet Temperature Se	1
26	453027000	Terminal Cover	1
29	467240008	Remote controller Assy.with batteries. R	1

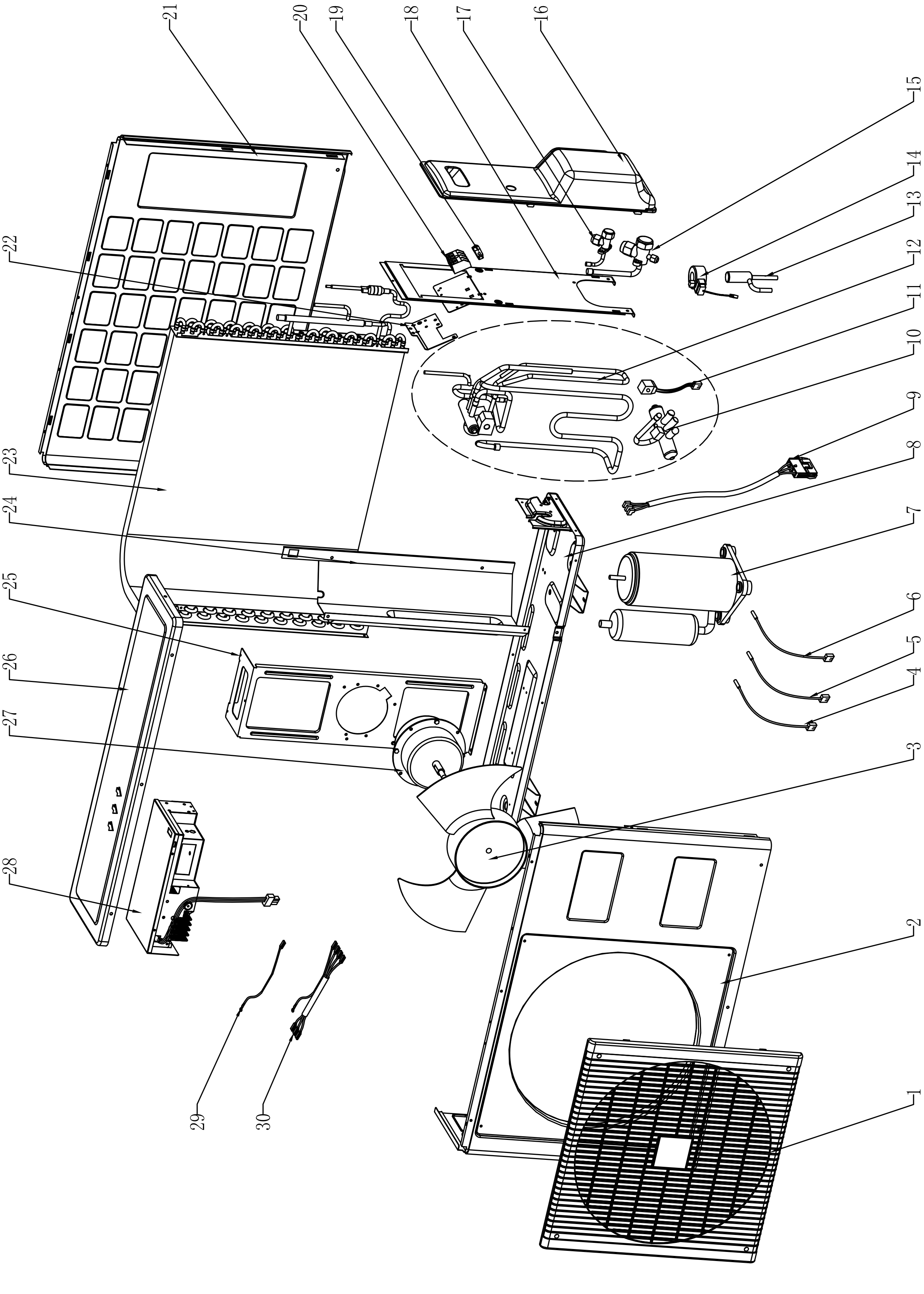
13.4 Indoor Unit: Delta 50 DCI



13.5 Indoor Unit: Delta 50 DCI

No.	Item	Description	Quantity
1	465800000	Grill A Assy./Delta 50	1
2	453080800	Filter	2
3	470500007	Nanometer Photocatalysis Deodorant Filt	1
3	470500010	Biological Sterilization Filter	1
4	465720020	Front Frame Assy./Delta 50	1
5	453081000	Screw Cover	3
6	462350006	Evaporator Assy.	1
7	4518662	Bearing assy fan	1
8	453082400	Impeller Fan	1
9	467300007R	Display Board Assy./DELTA EHK: 936A035-0	1
10	453101600	Air Outlet Frame Assy./ALPHA-	1
11	465210009	Drain Pipe for Israel /WNG18/24/30	1
12	453101400	Unit Housing Assy./ALPHA-17	1
13	453081900	Mount Bracket Assy.	1
14	4526000	TUBE CLIP	1
16	4523507	Step motor	1
17	455013305R	EUR EURPowerCord/3G/1.5/2100(250)	1
18	4518651	Cover Side Motor	1
19	453024500R	PG PG Motor	1
20	452918800	Cover/motor	1
21	467300006R	DCI Indoor Controller/DELTA EHK: 916A541	1
22	4525988	CABLE LOCKER	1
23	436525	SUPPLY CORD LATCH WMN	1
24	438082	Thermistor Indoor	1
25	467400024	(320mm) Indoor Air Inlet Temperature Se	1
26	453027000	Terminal Cover	1
27	465440001	Grill Left Crank	1
28	465440002	Grill Right Crank	1
29	467240008	Remote controller Assy.with batteries. R	1

13.6 Outdoor Unit: DCR 25, DCR 35 / 60Hz R410A



CONTENTS

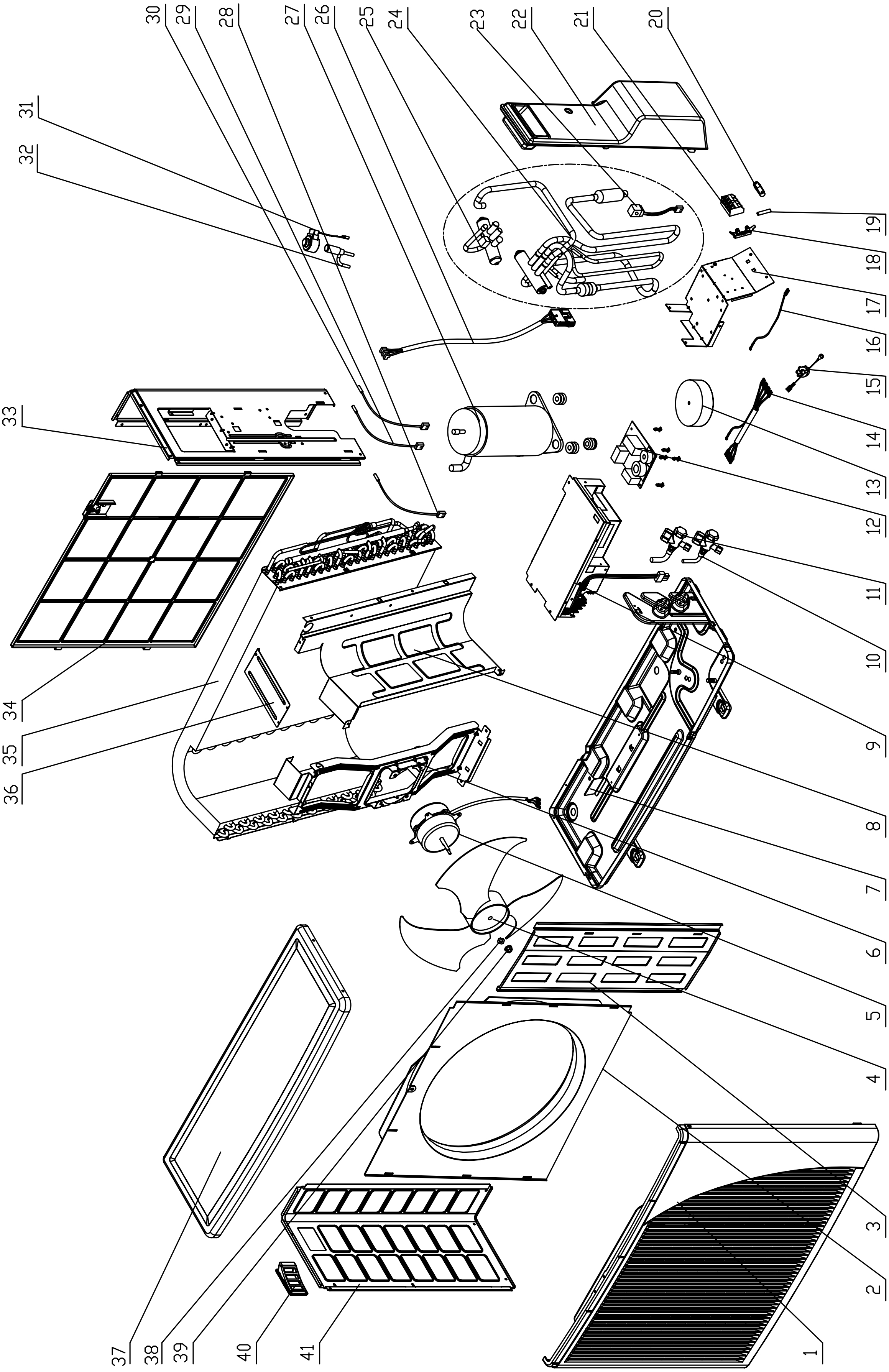
13.7 Outdoor Unit: DCR 25 60Hz

No.	Item	Description	Quantity
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	467400040	Condenser Middle Temperature Sensor/OAT	1
5	467400200	CTT Compressor Top Temperature Sensor/10	1
6	467400056	OCTOutdoorCoilTemperatureSensor/10K/Copp	1
7	453170100	Compressor Assy. MATSUSHIBA 5	1
8	453052500	PAINTING BASE ASSY.	1
9	467000001	Compressor Power Cord/DCR CR 25/35	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	453058700	4way valve soldering assy FOR	1
13	453026600	Electronic expansion valve ZDPF(L)-	1
13	461040000	Electronic Expansion Valve(DPF151-01 R41	1
14	4526216	EEV COIL QA(L)12-HR-01A-RK	1
14	461050000	Electronic Expansion Valve Coil(XQ05-211	1
15	461010004	GasValve3/8 R410A	1
15	463300505	Standard Valve Connect Pipe/Gas Valve/ T	1
16	4516857	BIG SIDE COVER	1
17	461000004	LiquidValve1/4 R410A	1
17	463300510	Standard Valve Connect Pipe/Liquid Valve	1
18	464630000	Side Plate Painting Ass	1
19	204107	Cable clip Nylon	1
20	4519188	4 poles terminal block	1
21	4516156	Rear panel Painting assy	1
22	453230000	Connect Plate	1
23	453048200	Condenser assy. (OD7x2rows) for DCR 9	1
24	453052700	PATITION	1
25	464860032	Motor Support Assy.	1
26	4516158	Cover panel Painting assy	1
27	453031300R	Metal motor 20W	1
28	467300276	/DCR 1.6Kw Controller Assy.	1
29	455015203	groundwire,,UL101516AWG(1.5),250,,85mm	1
30	453129300	Wire UL1007 16AWG/Controller with	1

13.8 Outdoor Unit: DCR 35 60Hz

No.	Item	Description	Quantity
1	4522551	Grille A of GCN	1
2	4523441	Front panel A Painting assy	1
3	4519251	Axial Fan OD=400	1
4	467400040	Condenser Middle Temperature Sensor/OAT	1
5	467400200	CTT Compressor Top Temperature Sensor/10	1
6	467400056	OCTOutdoorCoilTemperatureSensor/10K/Copp	1
7	4526204	DCI Compressor 5RS102XAB	1
8	453052500	PAINTING BASE ASSY.	1
9	467000001	Compressor Power Cord/DCR CR 25/35	1
10	4518951	4-W valve SHF-4H for R410A	1
11	4522509	4-Way valve coil	1
12	453058800	4way valve soldering assy	1
13	453026600	Electronic expansion valve ZDPF(L)-	1
13	461040000	Electronic Expansion Valve(DPF151-01 R41	1
14	4526216	EEV COIL QA(L)12-HR-01A-RK	1
14	461050000	Electronic Expansion Valve Coil(XQ05-211	1
15	461010004	GasValve3/8 R410A	1
15	463300505	Standard Valve Connect Pipe/Gas Valve/ T	1
16	4516857	BIG SIDE COVER	1
17	461000004	LiquidValve1/4 R410A	1
17	463300510	Standard Valve Connect Pipe/Liquid Valve	1
18	464630000	Side Plate Painting Ass	1
19	204107	Cable clip Nylon	1
20	4519188	4 poles terminal block	1
21	4516156	Rear panel Painting assy	1
22	453230000	Connect Plate	1
23	453048400	Condenser (OD7.94x2rows) for DCR 12	1
24	453052700	PATITION	1
25	464860032	Motor Support Assy.	1
26	4516158	Cover panel Painting assy	1
27	453031300R	Metal motor 20W	1
28	467300276	/DCR 1.6Kw Controller Assy.	1
29	455015203	groundwire,,UL101516AWG(1.5),250,,85mm	1
30	453129300	Wire UL1007 16AWG/Controller with	1

13.9 Outdoor Unit: DCR 50 60Hz



13.10 Outdoor Unit: DCR 50 60Hz

No.	Item	Description	Quantity
1	433218	Front Panel A	1
2	4526340	Air inlet ring-420	1
3	464860054	Painting Insulation Plate Assy/ONG	1
4	4526476	Axial fan OD=401	1
5	452889600R	DC Resin Motor(Nidec)	1
6	433215	Motor Support	1
7	4527363	Base Painting Assy.	1
8	4526299	Partition	1
9	467300025R	Controller/Outdoor Unit DCI 2.8kW(Englis	1
10	463300506	Standard Valve Connect Pipe/Gas Valve/ T	1
10	461010005	GasValve1/2 R410A	1
11	461000004	LiquidValve1/4 R410A	1
11	463300510	Standard Valve Connect Pipe/Liquid Valve	1
12	467300024R	Filter Board/901A108-00	1
13	4526396R	Choke assy. 167-021-01	1
14	453238600	Wire 1015 16#/Power Input	1
15	453238700	Wire UL1007 16AWG/COM	1
16	455015202	groundwire,,UL101516AWG(1.5),250,150mm	1
17	4526300	Therminal sheet	1
20	204107	Cable clip Nylon	1
21	4519188	4 poles terminal block	1
22	465340080	ValveCover/PPUV5VA/ONG3	1
23	4522509	4-Way valve coil	1
24	461600003	4-WayValveAssy	1
25	4518952	4-W valve SHF-7H for R410A	1
26	4526221	Compressor wire	1
27	4523446	Scroll comp assy. 5CS13	1
28	467400055	CTTCompressorTopTemperatureSensor/10K/Co	1
29	467400026	OAT Outdoor Air Temperature Sensor	1
30	467400056	OCTOutdoorCoilTemperatureSensor/10K/Copp	1
31	4526215	Electronic expansion valve ZDPF(L)-	1
32	4526216	EEV COIL QA(L)12-HR-01A-RK	1
33	4519606	Right side panel (painting plate)	1
34	433228	Back Side Net	1
35	470660008	CondenserList/DCR50R410A	1
36	4526298	Bridge	1
37	4519614	Painting Top Cover	1
38	4526480	Gasket for axial fan	1
39	4519300	Nut M5 L	1
40	433225	Handle	1
41	4519607	Left Side Panel Painting Plate	1

APPENDIX A

INSTALLATION AND OPERATION MANUAL

- ► **OPERATING MANUAL DELTA 25, 35, 50 DCI / DCR 25, 35, 50 60Hz**
- ► **INSTALLATION MANUAL DELTA 25, 35, 50 DCI / DCR 25, 35, 50 60Hz**